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Government
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First Session—Twenty-eighth Parliament

1968-69

THE SENATE OF CANADA

PROCEEDINGS OF THE SPECIAL COMMITTEE ON

SCIENCE POLICY

The Honourable MAURICE LAMONTAGNE, P.C., *Chairman*

The Honourable DONALD CAMERON, *Vice-Chairman*

No. 10-14

THURSDAY, NOVEMBER 21st, 1968

WITNESSES:

Department of Agriculture: Sydney B. Williams, Deputy Minister; James C. Woodward, Assistant Deputy Minister (Research); Bert B. Migicovsky, Director-General, Research Branch; Glen R. Purnell, Director-General, Economics Branch; Arthur J. Skolko, Research Co-ordinator (Plant Pathology), Research Branch; Kenneth F. Wells, Veterinary Director-General; and H. Ronald Manery, Programme Co-ordinator, Economics Branch.

APPENDIX:

10.—Brief submitted by the Department of Agriculture.

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1968

MEMBERS OF THE SPECIAL COMMITTEE
ON

SCIENCE POLICY

The Honourable Maurice Lamontagne, *Chairman*

The Honourable Donald Cameron, *Vice-Chairman*

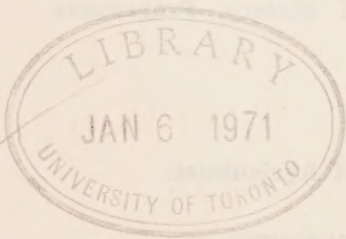
The Honourable Senators:

Aird,
Belisle,
Bourget,
Cameron,
Desruisseaux,
Grosart,

Hays,
Kinnear,
Lamontagne,
Lang,
Leonard,
MacKenzie,

O'Leary (*Carleton*),
Phillips (*Prince*),
Robichaud,
Sullivan,
Thompson,
Yuzk.

Patrick J. Savoie,
Clerk of the Committee.



ORDERS OF REFERENCE

Extract from the Minutes of the Proceedings of the Senate, Tuesday September 17th, 1968:

"The Honourable Senator Lamontagne, P.C., moved, seconded by the Honourable Senator Benidickson, P.C.:

That a Special Committee of the Senate be appointed to consider and report on the science policy of the Federal Government with the object of appraising its priorities, its budget and its efficiency in the light of the experience of other industrialized countries and of the requirements of the new scientific age and, without restricting the generality of the foregoing, to inquire into and report upon the following:

(a) recent trends in research and development expenditures in Canada as compared with those in other industrialized countries;

(b) research and development activities carried out by the Federal Government in the fields of physical, life and human sciences;

(c) federal assistance to research and development activities carried out by individuals, universities, industry and other groups in the three scientific fields mentioned above; and

(d) the broad principles, the long-term financial requirements and the structural organization of a dynamic and efficient science policy for Canada.

That the Committee have power to engage the services of such counsel, staff and technical advisers as may be necessary for the purpose of the inquiry;

That the Committee have power to send for persons, papers and records, to examine witnesses, to report from time to time, to print such papers and evidence from day to day as may be ordered by the Committee, to sit during sittings and adjournments of the Senate, and to adjourn from place to place;

That the papers and evidence received and taken on the subject in the preceding session be referred to the Committee; and

That the Committee be composed of the Honourable Senators Aird, Argue, Bélisle, Bourget, Cameron, Desruisseaux, Grosart, Hays, Kinnear, Lamontagne, Lang, Leonard, MacKenzie, O'Leary (*Carleton*), Phillips (*Prince*), Sullivan, Thompson and Yuzyk.

After debate, and—

The question being put on the motion, it was—
Resolved in the affirmative."

Extract from the Minutes of the Proceedings of the Senate, Thursday, September 19th, 1968:

"With leave of the Senate,

The Honourable Senator Lamontagne, P.C., moved, seconded by the Honourable Senator Benidickson, P.C.:

That the name of the Honourable Senator Robichaud be substituted for that of the Honourable Senator Argue on the list of Senators serving on the Special Committee on Science Policy.

The question being put on the motion, it was—
Resolved in the affirmative.”

ROBERT FORTIER,
Clerk of the Senate.

MINUTES OF PROCEEDINGS

THURSDAY, November 21st, 1968.

Pursuant to adjournment and notice the Special Committee on Science Policy met this day at 10.00 a.m.

Present: The Honourable Senators Lamontagne (*Chairman*), Belisle, Hays, Kinnear, Robichaud, Thompson and Yuzyk. (7).

In attendance:

Philip Pocock, Director of Research (Physical Science).

The following witnesses were heard:

DEPARTMENT OF AGRICULTURE:

Sydney B. Williams, Deputy Minister;

James C. Woodward, Assistant Deputy Minister (Research);

Bert C. Migicovsky, Director-General, Research Branch;

Glen R. Purnell, Director-General, Economics Branch;

Arthur J. Skolko, Research co-ordinator (Plant Pathology), Research Branch;

Kenneth F. Wells, Veterinary Director-General; and H. Ronald Manery, Programme Co-ordinator, Economics Branch.

(A curriculum vitae of each witness follows these Minutes.)

At 12.45 p.m. the Committee adjourned until 3.30 p.m. this day.

AFTERNOON SITTING

The Committee resumed at 3.30 p.m., the Chairman, Senator Lamontagne, presiding.

Present: The Honourable Senators Lamontagne (*Chairman*), Belisle, Hays, Kinnear, Robichaud, Thompson and Yuzyk. (7)

In attendance:

Philip Pocock, Director of Research (Physical Science).

The witnesses at the morning sitting were further questioned.

The following is printed as Appendix No. 10:

Brief submitted by the Department of Agriculture.

The Department has also submitted 19 appendices in support of their brief. These have been retained by the Committee as Exhibits.

At 5.45 p.m. the Committee adjourned to the call of the Chairman.

ATTEST:

Patrick J. Savoie,
Clerk of the Committee.

Purnell, Glen R. B.S. (1952) Utah State; M.S. (1953) Montana State; Ph.D. (1959) Iowa State; 1953-54, Fieldman, Federal Land Bank of Spokane; 1954-55, Assistant Secretary, Oregon Wheat Growers' League; 1955-57, Executive Secretary, Oregon Soil Conservation Commission; 1957-59, Research Associate in Agricultural Policy, Iowa State University; 1959-61, Assistant Professor, Agricultural Economics, University of Idaho; 1961-68, Director of Economics, Alberta Department of Agriculture; 1968, Director-General, Economics Branch.

Skolko, Arthur J. B.Sc.F. (1935) Toronto; M.A. (1939) Toronto; Ph.D. (1943) Toronto; 1939-46, Forest Pathologist, Division of Botany and Plant Pathology, Canada Agriculture; 1946-48, Head, Forest Pathology Laboratory, Fredericton, N.B.; Honorary lecturer, Biology Department, University of New Brunswick; 1948-55, Head, Seed-borne Diseases Unit, Division of Botany and Plant Pathology; 1955-58, Associate Chief, Division of Botany and Plant Pathology; 1959, Research Coordinator (Plant Pathology), Research Branch.

Wells, Kenneth F. D.V.M. (1939) Guelph; 1939, Lecturer, Macdonald College; 1940-45, Contagious Diseases Control Division, Canada Agriculture; 1945-47, Supervisor, Pullorum Control and Hatchery Sanitation; 1947, Health of Animals Branch; 1952, Chief Veterinarian, Health of Animals Branch; 1955, Veterinary Director-General.

Mannery, H. Ronald B.Sc. (1947) Alberta; B.Litt. (1954) Oxon; 1947-51 and 1954-55, Economist, Economics Branch; 1956-57, seconded as Agricultural Economist to Development and Welfare Organization, British Colonial Office; 1958-59, Economist, Economics Branch; 1960-66, Chief, Publications Section, Information Division; 1967, External Aid Assignment to Trinidad and Tobago; 1968, Programme Co-ordinator, Economics Branch.

Curriculum Vitae

Williams, Sydney B. B.S.A. (1934) McGill; M.Sc. (1936) McGill; 1935-52, Research officer, Animal Husbandry Division, Canada Agriculture; 1941-45, Canadian Army; 1952-59, Superintendent, Experimental Farm, Nappan, N.S.; 1959, Director of Administration, Research Branch; Director of Administration, Department of Agriculture; 1960-62, Director-General, Production and Marketing Branch; 1962-67, Assistant Deputy Minister (Production and Marketing); 1967, Deputy Minister; 1962, Chairman, Agricultural Stabilization Board.

Woodward, James C. B.S.A. (1930) McGill; M.S. (1932) Cornell; Ph.D. (1934) Cornell; Post-doctorate transfer (1948) California; 1929-31, Assistant Agronomist, Quebec Department of Agriculture; 1934-37, Research Assistant, Chemistry Division, Canada Agriculture; 1937-41, Chemist, Chemistry Division; 1941-45, Canadian Army; 1946-48, Chemist, Pilot Fibre Flax Mill, Portage la Prairie; 1948-49, Head, Plant Chemistry Section, Chemistry Division; 1949-55, Chief, Chemistry Division; 1955-59, Associate Director, Experimental Farms Service; 1959-63, Assistant Director-General (Program), Research Branch; 1963-68, Associate Director-General, Research Branch; 1968, Assistant Deputy Minister (Research).

Migicovsky, Bert B. B.S.A. (1935) Manitoba; M.S. (1937) Minnesota; Ph.D. (1939) Minnesota; Post-doctorate fellowship (1953) California; 1940-42, Chemist, Vitamin Assay Laboratory, Canada Department of Agriculture; 1942-45, Canadian Army; 1945-55, Chemist, Chemistry Division; 1955-59, Head, Animal Chemistry Unit, Chemistry Division; 1959-64, Head, Biochemistry Section, Animal Research Institute; 1964-68, Assistant Director-General, Research Branch; 1968, Director-General, Research Branch.

THE SENATE

SPECIAL COMMITTEE ON SCIENCE POLICY

EVIDENCE

MORNING SITTING

(first session)

Ottawa, Thursday, November 21, 1968.

The Special Committee on Science Policy met this day at 10 a.m.

Senator Maurice Lamontagne (*Chairman*)
in the Chair.

The Chairman: Honourable senators, as we are all aware, the Department of Agriculture has been one of the oldest research agencies in science in Canada and still is one of the most important research centres within the federal government.

This morning we are very pleased indeed, I am sure, to have with us a very important delegation from the Department of Agriculture, headed by Mr. Sydney B. Williams, the Deputy Minister, Dr. Woodward, Assistant Deputy Minister in charge of research, Dr. Migicovsky, Director-General, Research Branch, Dr. Purnell on the extreme right, Director-General, Economics Branch, Dr. Skolko, Research Co-ordinator, Plant Pathology, Research Branch, and, finally, Dr. Wells, the Veterinary Director-General.

I am sure that with this kind of delegation, sir, all members of the Committee will receive full answers to their questions, but before we come to the general discussion period I understand that Mr. Williams, the Deputy Minister, wants to make an opening statement which will give us some highlights of the documentation which has been supplied to the Committee.

Mr. S. B. Williams, Deputy Minister, Department of Agriculture: Mr. Chairman, honourable Senators, I and my colleagues welcome very much the opportunity you have afforded us today to appear before you and to discuss with you our brief.

As the Chairman has mentioned, we have here with us the Assistant Deputy Minister,

who has direct responsibility for research across the whole department, as well as the three director-generals of the branches in which we have our research effort. I will not introduce these gentlemen again, this has been done, but I would like to say at the onset that while I am going to make the opening statement I expect these gentlemen to bear the brunt of your questioning.

Also we have with us Dr. Skolko, who is a research co-ordinator in the research branch and whose function was the immediate responsibility for the collection and collation of the material that appears in the brief. The brief itself is the result of a joint effort of a committee representing the various fractions of the department in which research is involved. In carrying out the task of preparing the brief, we have consulted with your directors of research and I may say that I believe we have honestly made every effort to provide information both as to format and as to content as set out in your guidelines.

Your Chairman has mentioned the fact that the Canada Department of Agriculture is one of the oldest research entities within the federal service; it was established in 1887 as the result of an act that was passed in 1886. Originally it consisted of five experimental farms and the original work consisted very largely of the testing of varieties and the testing of practices.

About the mid-thirties the department underwent a reorganization and involved in this reorganization was the research branch. The reorganization was motivated largely by the fact that agricultural research was increasing in complexity and it was felt desirable to emphasize specialization in order to attract specialists to various areas.

At that time the service was divided into two discreet units, one known as the Experimental Farm Services and the other side known as the Science Services. This organization continued until 1959 and there was a

growing feeling at that time that once again, and this may sound a little contradictory, but we took opposite action because of essentially the same facts, but it is not quite as contradictory as it may sound, in that the action was once again motivated by increasing complexity, this time not of the fields of study so much as the problems. It was felt that the only way that some of these major problems could be handled was through the team approach. Consequently the Science Service, as it was then known, and the Experimental Farm Services were amalgamated into a single branch, known as the Research Branch. That organization stands at the present time and you do have in your documents charts showing the details of organization.

In so far as research is associated with health of animals and veterinary practice, it is maintained as a separate unit within our Health of Animals Branch and it supports the activities of the Health of Animals Branch as well as doing research in the overall area of livestock health.

Our Economics Branch, while it is a separate unit that stands by itself, provides research and support facilities for the entire department.

I would ask you, ladies and gentlemen, to examine the brief in the light of the fact that agriculture is our most important primary industry. It has been and is undergoing extremely rapid change. The number of farmers has decreased from over 733,000 in 1941 to just over 430,000 in 1966. During this same period the total farm area has remained essentially constant at about 174 million acres. Obviously with the decrease in the numbers of farmers farm size has increased proportionately and over the period changed from 237 acres to 404 acres.

It is noteworthy that over the same period total productivity increased by about 67 per cent. Along with the increase in farm size and in productivity has come an increase in capitalization—land, machinery and equipment, and livestock.

Perhaps more important, not only has our average Canadian farm changed physically, but the complex interrelationships of the production operations of the farm with the manufacturing and distribution of supplies and equipment to be used on the farm and with the processing and distribution functions for farm products has greatly changed.

In 1967 goods and services used by farmers in their farm business, as distinct from their own living costs, were valued at \$2.6 billion as compared with \$1.4 billion a short ten years earlier. On the output side, about 25 per cent of our manufacturing industries are users of raw material of farm origin. In 1964, the latest year for which complete information is available, some 7,400 establishments out of a total of 33,000 manufacturing plants were engaged in processing foods.

Nor can we forget the impact of the rapidly changing agriculture on the consumer. The percentage of disposable income used for food has decreased year after year from about 25 per cent through the early fifties to under 20 per cent at the present time. This has occurred at the same time that we have enjoyed steadily increasing quality, variety and convenience in our diet. To put it another way, an average hour's earnings by a worker in the manufacturing sector in 1946 bought 1.4 dozen eggs. In 1967 it bought 4.4 dozen.

However, ladies and gentlemen, your assignment this morning is to inquire into the research and development activities and expenditures of the Department of Agriculture and my specific assignment is to highlight the detailed information contained in our submission to you. In the administration of some 34 acts of parliament and the overall co-ordination of agricultural effort, there are many facets of work in our department. Research and development is an integral part of the over-all program as our scientists attempt to solve problems rather than to design procedures to live with them; as they attempt to ensure that regulations under the acts are based on sound scientific principles; and as they are the source of expertise in coping with the day-to-day problems presented to the department.

Our brief and the appendices are contained in the envelope before you. The brief, the document in the black cover, is organized as laid down in your guidelines. I will attempt to highlight each section.

On pages 7 to 22 we deal with the problem of organization and here I would wish to draw your attention in particular to the role of the Canadian Agricultural Services Co-ordinating Committee and its subcommittees in co-ordinating the total Canadian agricultural research effort, which involves the federal government, the provincial governments

and universities. In addition, of course, industry participates in the work of certain of the subcommittees, in particular those involved with pesticides and with soil fertility practices.

You will note that the section includes detailed organizational charts for our research branch, the economics branch, the animal pathology division of the health of animals branch, the library, and the grain research laboratory of the Board of Grain Commissioners. It includes also reference to the Commonwealth Agricultural Bureaux and the Food and Agricultural Organization of the United Nations.

The following 30 pages deal with organizational functions. In it our functions and responsibilities under our statutory authority are described in some detail. The primary aim or objective is to improve the efficiency of production and quality of agricultural products and to develop and modify products to meet current and future market requirements. Our activities towards this aim are mission- or problem-oriented but broadly founded on basic, applied, and developmental research. They include providing leadership in the development of a balanced, co-ordinated program of agricultural science in Canada. We will require further clarification of the role of the Canadian Agricultural Services Co-ordinating Committee in the agricultural sphere relative to that of the Science Council role in total Canadian research and development.

The next five pages deal with the questions you have raised in respect of personnel policies. Our personnel policies as they relate to recruiting, training and development have been, we believe, reasonably satisfactory. Our most serious limitation has been our inability to compete for scarce resources because of the inflexibility of federal salary scales. Currently, economists, agricultural engineers, as well as French-speaking Canadians generally are in short supply.

The new research management and research scientist classes represent real progress in our view in personnel management. We need now such a class for economists, where progression will be related to accumulated and current productivity rather than to establishment.

Following that is the section that probably is of greatest significance to us and possibly to yourselves; that is the section that deals

with the distribution of activities and the allocation of resources.

The distribution of activities in a problem-oriented department such as ours is under continuing review. We must consider not only an organization for effective research, but an organization which lends itself to the closing of the gap between knowledge and practice. The latter is promoted by associating scientists with problems where they occur, with the initiator producers, and with the provincial staff involved in recommending practices, and in extension.

With improved communication and transportation facilities the trend has been to concentrate staff at fewer establishments, to take advantage of multi-disciplinary capabilities and the economy of shared facilities. It is our belief that this trend will continue.

Then follow 12 pages of facts and factors associated with personnel that are involved in our scientific activities. In this you will note that some 41.5 per cent of departmental personnel are engaged in scientific activities. Of these, 26 per cent are in the professional category and the remaining 74 per cent are in support of the activities of the professionals. The trend is and shall be towards a widening of this one to three ratio of professional to support staff.

I am concerned, particularly in a department such as ours which I have indicated is problem-oriented, that 39 per cent of our Ph.D.'s are of foreign birth. This is reflection of the supply of qualified Canadians available at the salary scales which prevailed prior to 1968. The supply is related to the number of Canadian undergraduates who go forward to agriculturally-oriented graduate studies rather than to the facilities for graduate work. It is our view that the Public Service Commission's new career introduction program is a step in the direction towards a solution to this problem.

We have a short section of two pages covering expenditures associated with our scientific activities. I may say that the historical expenditures, as contained in this section, are not very meaningful unless supported by examples in terms of buying power. For example, the operating budget of the research branch increased from \$22.7 million in 1961-62 to \$34.9 million in 1968-69, or by about 54 per cent. The costs in salaries and wages per man-year increased 63.8 per cent, while costs of non-pay items increased 36.4

per cent. In 1968-69 the pay component represents 79.6 per cent of the operating costs. Thus it is obvious that despite the increases in the actual budget, these increases are not keeping up with costs.

A major section follows associated with research policy; here we have gone into considerable detail on our approach to establishing priorities, both intramurally and extramurally between programs and projects and our procedures for authorizing and discontinuing activities. For many years we have operated on a formal project system which we believe is probably one of the best and most mature and most sophisticated in the world. Thus we have a tool for the continued evaluation of our program in the light of the changing needs of the industry. It is proving invaluable in implementing the new techniques of managing by objectives and of planning, programming and budgeting. Our primary means of adjusting between program areas is in recruiting replacement scientists. For example, in the period under review we have been able to completely adjust our approach to the chemical control of pests largely by replacing economic entomologists with pesticide chemists. We have built up a sound corps of mathematical statisticians to improve our experimental designs and permit the exploitation of advances in data processing; we have established our Food Research Institute and we are making progress toward strengthening our program in agricultural engineering.

We probably should have elaborated further on our efforts to transfer research results to users. One important development which is not mentioned is our policy of offering accommodation at our research stations to provincial extension personnel. For example, extension personnel at Kentville, Delhi, Harrow and Saskatoon, that is provincial extension personnel, are now housed with our staff.

In terms of sheer volume the greatest portion of your book is taken up with research output, which runs to just under 50 pages.

It is easy to list numbers of publications, patents, et cetera, as a measure of research output. However, our over-all interest is the realized and potential contribution to the economic and social advancement of Canada.

In my opening remarks I mentioned the great increase in productivity, the growth and development of both the input and output industries, and the fact that the consum-

er is requiring a continually decreasing portion of his disposable income to provide an increasingly sophisticated diet. Our research and technology we believe have played no small part in these developments.

To return to the brief, however, you will find several examples of economic and scientific contributions. These are taken from reports by directors and have been selected to give a representative spectrum from highly applied research to research in considerable depth. If you examine the headings I am sure you will find examples that will be of particular interest to you.

I may say also that at the end of the room we have set up a display of some of the publications, both continuing publications and specialized publications, as well as publications that are essentially extension and this is, I can assure you, ladies and gentlemen, only a sample of the type of thing that is being put out at the present time and has been put out in the past by the department.

Projects: this section, with appendices 11 to 18, includes our complete lists of projects for the years 1964 and 1968. The decrease in the number of projects in the research branch and the grain research laboratory is due to our efforts to consolidate lines of investigation designed to solve a specific problem as a single project. For example, in a given plant breeding project, we may have grouped the work of a multi-disciplinary team of breeders, physiologists and pathologists together, and included the introduction of genetic materials and the testing of selections arising from the research. Thus, the trend to fewer projects reflects evolution in the development of our system. Presently, in implementing the new concepts of management by objectives and planning, programming and budgeting, we are defining objectives and goals and grouping projects as activities toward each goal. In addition, we are attempting to develop a system of cost/benefit analysis to apply to these projects.

I think you will be interested in our program as it relates to the over-all Canadian effort. Appendix 2, the small yellow covered pamphlet, is a report on our 1966 inventory of research projects. The results are summarized in Tables 1 to 10.

I would prefer to conclude my opening remarks now in anticipation of the questions you may wish to raise. I know that agriculture has many problems which are attracting the attention of the general public and its

representatives. We are appreciative of this opportunity to supply you with the information you have requested. I assure you that Dr. Skolko and his committee have made an honest effort to follow your guidelines and that the brief has not been biased by my opinions or those of any other senior officials.

I would like, however, to qualify one thing that appears in the brief, namely the recommendation suggesting a nominal growth rate of 3 per cent. This relates to growth in manpower. My best information is that it is necessary to increase financial support by from 10 to 12 per cent per annum in order to maintain the established level of activity.

Thank you, Mr. Chairman.

The Chairman: Thank you very much, Mr. Williams. Now we will have our usual question period; I am sure that you will recognize the member of the Committee who will initiate the discussion this morning, Senator Hays.

Senator Hays: Thank you, Mr. Chairman. First, Mr. Chairman and gentlemen, I would like to commend the Department of Agriculture for the work that is in the brief. I have had the opportunity and pleasure to be at most of the meetings that we have had of the scientific policy committee and I think this is certainly comparable with the very best briefs. It is well covered. I think it is a real honest effort to present all of the problems and all of the work that the research department is doing in the Department of Agriculture. I think it would take three or four days to examine it properly and I know that we just have today and I have a number of questions, but it is an excellent brief and I want to congratulate you on the brief and those who were responsible for putting it together.

Some of the questions that I should like to ask, and I will give them singly, are old programs and how do you decide to get rid of old programs? How your costs relate to the costs in the United States in so far as research is concerned, or how does our budget compare with the United States' budget? What we are doing in the field of basic research, and all that sort of thing, and inasmuch as Mr. Williams, the Deputy Minister, was chosen one time as one of our Olympic people to go to Finland, I would like as the last question to ask him by how many points he believes Calgary will beat Ottawa in the Grey Cup?

The Chairman: Well, I must say that your question would be out of order.

Senator Hays: In connection with federal-provincial problems, and you mentioned federal-provincial jurisdiction in the field of agriculture and according to the B.N.A. Act, it is discussed on page 23 and on page 37 it is stated:

Since jurisdiction over agriculture is shared by federal and provincial governments, and since jurisdiction over scientific activities is not mentioned in the B.N.A. Act at all, there would appear to be a tremendous field for duplication and conflict.

I am going to skip around a bit. On page 92, paragraph 2, it is stated:

While the responsibility in the field of extension of the results of research to the ultimate user lies primarily with the provincial authority, most provinces have not or cannot meet their obligation. Even those provinces with the most highly developed extension services have not adequately exploited the technological advances provided by research.

In the recommendation we read:

As the programs of the provincial governments mature, emphasis by the Canada department must be on supporting rather than usurping or duplicating efforts in research, development and extension.

Regarding the federal-provincial relations in the instituting of crop insurance we read on page 153, paragraph 3:

A difficult part of the process was in setting up a program which would require provincial government administration but for policy reasons could not be discussed with provinces in advance. The program had to be one which would be acceptable to provinces but one on which they could not be consulted.

On page 48, in the Glassco Commission, a comment on the Economic Branch:

...with the largest economic analysis organization in the government, the pressure of ad hoc projects is so great that virtually no economic research is done, although the agriculture economy has undergone profound change in recent times and a fundamental understanding of the process is absolutely vital."

In regard to this the brief states: "Unfortunately, there has been no appreciable improvement in the situation since that time."

On page 52 the Glassco Commission recommended more funds to be spent in the animal sciences and the brief states:

We envisage some redistribution of R and D effort in favour of the animal sciences. Both the Glassco Commission and the Economic Council of Canada have suggested that this area of research needs more attention.

Now, what is the process whereby the need for change in research programs should proceed and more importantly how do you propose that the changes should be implemented?

Mr. Williams: Mr. Chairman, Senator Hays, despite the fact that the Chairman ruled your question out of order, I think it would be a lot easier to answer your question with reference to the Calgary-Ottawa score than the one that is in order.

The Chairman: That is where you could be quite wrong though.

Mr. Williams: But it would be easier to answer, sir; I may be quite wrong in both of them.

The points that you have raised, sir, are points that are of continuing concern to us. I think possibly the best way that I can deal with them is to try and isolate some of them, rather than try to gather them in broad generalities.

You first spoke, sir, of the possible difficulty facing the department in its relationships with provincial governments and the possible overlap and the role that the department plays in getting its research results to farmers.

I mentioned in my opening statements that one procedure that we follow is the procedure of having people oriented, actually located at least on some of our research stations, but I think that if I could take the time of the Committee for a moment I would like to mention a development that is affecting our economics branch, it is affecting our research branch, it is affecting our entire department, and that is the development of a completely new and different concept, and that is a complete national farm accounting and farm management system.

We have now been working with the provinces and within the department for some

three years, or probably a little longer than three years, and I am sure Senator Hays recalls when this was started, to develop such a system. The system is now ready to go into effect.

Under it the farmers of Canada will be offered a farm accounting and management system. The farmer will elect the level of sophistication that he might wish to undertake on his own part in order to provide him with the necessary accounting and farm management analysis.

The allocation of responsibility for it is still under discussion; there is a meeting to be held next week at which it is expected that a temporary allocation of responsibility will be made for the next three years during the formative and developmental stages of the program, but briefly our thinking runs something like this: that the provinces will assume responsibility for direct contact with the farmer; the federal department will assume responsibility for the compilation and analysis of the data.

Now, if I might take as I say a moment to explain the program: a farmer subscribes to this service; he provides certain information to a centrally, regionally located computer facility; the facility provides him with a monthly report on his operating position. It can be, as I said earlier, at several levels of sophistication, either from an all farm operation or from individual enterprises within the farm.

In addition to that, the program envisions the input into the system of economic marketing research management inputs in order that the system will provide him through the province and through the provincial extension worker with management alternatives.

We believe most strongly that this system represents probably the greatest forward step that we could possibly make in bringing together federal-provincial interests in the area of getting research back to the farmer.

Mind you, it will not be just a question of getting research itself back to the farmer; it will also provide him, as I said earlier, with various economic and management inputs.

Senator Thompson: I wonder, Mr. Chairman, just to clarify that for myself as a layman in farming: to put it in my simplest terms, if I had 25 pigs, I am of Irish background, that is why I take that example. I ask to be part of this management service. You people would have a computer system whereby you would first of all suggest to me

the kinds of feed I should buy, the kind of increase in weight of the pigs that should take place, how much my costs should be on buildings, and so on.

Is that the type of thing at its most unsophisticated level?

Mr. Williams: Yes; I would say basically that is the answer. You, as the farmer, provide the computer with certain information in respect of your operation; the computer maintains a complete record of your entire farm operation, of the facilities you have, what your crop program is, and I envision it first of all, or at least I should not say I envision it, it envisions first of all that you will have information as to whether or not you are making a profit on those 25 pigs to start with and will provide you with information to assist you with your income tax, and so forth, but as it develops in sophistication it will provide you with management information.

For example, it will doubtless some day be able to give you the answer as to whether or not the ration you are feeding includes too much barley or too little barley, or too much protein or too little protein, or whether you should buy your own pigs or raise your own little pigs, and things of this nature.

Senator Thompson: And the computing system is what the Economic Council was mentioning in their report that you were doing a study on; is this it?

Mr. Williams: That is correct, yes.

Senator Hays: What is the experience of the United States in so far as these cost benefit analyses are concerned, or have they gone into this field, or what countries have?

Mr. Williams: I think I will ask Dr. Woodward to speak on that.

Dr. James C. Woodward, Assistant Deputy Minister (Research), Department of Agriculture: Mr. Chairman, there are a number of countries under the OECD studying methods for an approach to cost benefit analysis on research, but they are finding this is a very difficult field, particularly in government laboratories, because the government must be prepared to consider factors other than straight economics, such as social factors and also factors that are protecting a particular market, factors such as the exclusion of a disease from Canada so as to protect our export markets and also to protect our own primary producers. We are making some pro-

gress in evaluating the potential benefits of research.

This becomes increasingly more difficult as research becomes more basic, because it becomes almost impossible to predict when a breakthrough will occur.

Did I cover the field that you were interested in, Senator Hays?

Senator Hays: Partly; are there any countries that you know that have this sort of a service now already perfected as you envisage it?

Dr. Woodward: This relates the CAN-FARM system?

Senator Hays: Yes?

Dr. Woodward: Not to my knowledge.

Mr. Williams: I think that Dr. Purnell, the Director-General of the Economics Branch, could best answer that.

Dr. Glen R. Purnell, Director-General, Economics Branch, Department of Agriculture: I do not know of any country as a country which has a system of this kind in operation.

There have been systems developed by various states in the United States and by various other portions of other countries, but one of the problems that they have run into is that the farmers in a state commence to want to compare themselves with farmers in another state, with farms of a similar type and nature and there is a definite lack of uniformity in the system in the approach to analysis, in the approach to the record-keeping in the physical input data that is required in the various states, so it is impossible for farmers to make a direct comparison and it is impossible for researchers to make direct comparisons.

In order to overcome this type of problem in Canada, the co-ordinated effort was initiated in 1962 to establish a uniform record-keeping accounting and analysis system that would be made available in Canada across the country so that all farmers who wished to voluntarily participate could do so through their provincial extension service and throughout Canada in a centralized analysis program.

One of the real benefits of the CANFARM type of operation is the establishment of the national data bank. This national data bank then provides information which can be used as a comparison of the same type of farm from one area to the next.

The data bank will also provide information to policy makers and researchers as a means of evaluating problems and developing programs and policies that can help farmers of similar types all across the country.

So this is the situation in Canada as compared with other countries in the experience in these other countries.

Senator Hays: This is not a related subject really: In the Department of Agriculture how do you handle the priorities in so far as research, and this is a great problem, and how do you propose to do this in the future?

I am thinking about applied research, research that is needed immediately in so far as basic research is concerned.

How do you wash out old programs? How do you get rid of them? When do you say well, this is enough?

Mr. Williams: Well, first of all, as you quite rightly say, sir, it is an on-going and extremely difficult problem. The formal method is through our project review system that requires periodic reviews of projects for productivity. It requires that all projects other than certain trial projects, shall I say, must receive formal approval before people, no matter where they are located in Canada, can proceed to make any major expenditures on them.

So we do have a formal system of review, analysis and consideration of all projects, both on a continuing basis and on a basis of initiation.

The question of establishing priorities I think is one that is receiving a great deal of attention with us at the present time. The way that we are trying to approach this problem is first of all through the development of cost benefit techniques; and secondly we are developing a group within our Economics Branch who will have responsibility for working directly with our researchers, that is our agricultural research groups, in order to, shall I say, ensure that the economic philosophy is brought to the research people.

These people will be located on our stations and will be involved in all phases and all stages in the planning and development of projects.

Senator Hays: Can you give us some examples of how you propose to do this within the department now with certain projects?

Mr. Williams: I think I will ask Dr. Migicovsky to answer that.

Senator Hays: I do not know whether, doctor, you are still trying to make Holstein cows out of chromosomes and genes or not; I am kind of relating it to that.

Dr. Bert B. Migicovsky, Director-General, Research Branch, Department of Agriculture: Yes, but won't you be surprised when we succeed?

Senator Hays: I presume that it is still going on?

Dr. Migicovsky: It is still going on, to a degree.

This question on introducing economic thinking into our projects is quite obviously a great necessity in many of the areas.

For example, turning the range land of Saskatchewan into pasture represents a problem that we have had over the last number of years. The question arises, of course, whether doing this would be economically feasible, or an economic advantage, and before we could do it do the necessary scientific work to indicate how we can do it, and in fact most of that has been done and has now been completed. It now depends upon an economic analysis to see whether in certain areas this is really going to be a pay-off.

You can tell the farmer how to do it, but he is going to ask you is it worth my while and before you tell him you need to make an economic input into this kind of study. This is the kind of thing that we are planning, that we have economists working with our research people right at the Swift Current research station, for example. It goes on in any other area of work where you are going to introduce a certain type of control. For pest control we might work out all the techniques necessary to say control the codling moth in B.C. Now it is a question whether with the type of input required after we work out the techniques the results obtainable would be worth while.

This requires obviously economic study; the price of a product would enter into it; the market for the product, because of the input into introducing control.

We might discover for example, a chemical that would be very, very effective in eliminating pest damage on a certain crop but the cost of the chemical might be so prohibitive that scientifically it would be a very success-

ful project but economically a complete flop. There is where the economist has to come in.

There are many factors that enter into deciding whether introducing a research result is going to pay off, not only strictly cost of input. There are many factors involved and this is where we hope the economists coming in and working with our research people will guide us. What we would like to see is the economist right in at the bottom of a project right when the project starts to try and predict whether it is going to be worth while to really carry on the work. This is where the really big difficulty comes in, because of our inability to predict completely what is going to happen with the scientific aspect of the project and make an economic prediction as to what is going to happen within five years when the cure is ready to be applied.

There are difficulties, obviously; if it was easy we would not have any problems, but because it is difficult is where we need the best brains that we can get to work on this type of thing.

Senator Hays: Then Mr. Chairman I would like to go back to this program that we were speaking about, your cattle program: Do you know how much money that you have spent on that program now and in so far as economics are concerned what it will prove in the future?

Dr. Migicovsky: We could get the cost input; are you talking about the dairy cattle project?

Senator Hays: Yes.

Dr. Migicovsky: We have the cost input on this. Now, if you are asking for a benefit analysis at this point in time we cannot give you one.

Senator Hays: Would some of these programs not be better done by other countries that have more money in this sort of thing and that we should be using our money probably where we would receive more economic benefits in the short term?

The Chairman: Could we have a description; of course, Senator Hays, you know all about it.

Senator Hays: Well I really do not know about it; that is why I am trying to find out. I never could find out. I thought this would be a good opportunity.

The Chairman: Could you give us a description of the research program?

Dr. Migicovsky: The dairy cattle breeding project is one that goes back for a good number of years; that the plan is to increase the efficiency of milk production in effect.

The use of the old techniques of using the purebred and selecting on the basis of conformity and the various factors and characteristics of a dairy cow has led us to a plateau with respect to our ability to increase efficiency of production. Our geneticists have set to work and have dreamed up and have proceeded to work on this dairy cattle project which introduces other techniques and other means of selection.

In many cases it would appear that some of the time the characteristics important to the breeder have been shown to be possibly of less significance; therefore it enables selection to be more efficient.

This project has been going on and obviously in any kind of genetic project with an animal the size of a cow the numbers required are quite great and obviously the expense considerably high.

The success to date; this project is now under review and the review will be completed some time in January, we hope, at which time we will take a good look at this project and see whether changes should be made in it, whether it should be eliminated, or whatever might be the advice of our experts.

The Chairman: When was it initiated?

Dr. Migicovsky: I do not quite remember, but I think it was initiated way back in...

Senator Hays: 1956.

Dr. Migicovsky: Before 1956; some time in the early fifties.

The Chairman: It is really a long term project?

Dr. Migicovsky: Any genetic project with a large animal is, of necessity, a long term project, because the gestation period of a cow is nine months.

Senator Hays: Well doctor, I am glad you are reviewing it.

Mr. Williams: I think, Mr. Chairman, that the point Senator Hays made is a very important one; as I said earlier, it is one that concerns us greatly.

It is our most sincere hope that the approach that we are putting into effect at the present time will try to evaluate the potential success, not only of the project as a scientific endeavour, but also as a success in terms of value for money spent.

Senator Hays: May I ask one other question, and I direct this to Dr. Wells: I notice in the brief somewhere the work that you have done on bluetongue and being able to establish the fact that you can segregate it. As you know, Australia will not permit any livestock in; we do not have bluetongue but we are not allowed to export because they think maybe that we have bluetongue, or we buy cattle from the United States and they have bluetongue.

How do we become involved in world programs so that countries do accept that we do know what we are talking about and that it is meaningful and that sort of thing, or how do you resolve these problems?

Dr. Kenneth F. Wells, Veterinary Director-General, Department of Agriculture: Mr. Chairman, first of all we do with respect to our need to keep Canada free of serious animal disease keep a very, very close study and watch on animal diseases in all countries throughout the world. This is becoming particularly important because of increased international trade and the possibility of introducing these diseases through this trade. Thus we maintain a very close contact with all countries in the world.

When situations such as this come up we do our utmost to establish firmly in our own minds and conclusively that the disease situation as it exists in Canada is well known to ourselves and can be proven. Then through our international contacts and through the International Office of Epizootics in Paris we attempt to convince the particular country concerned, such as the example you give with respect to Australia, that we in fact are free of bluetongue.

We have talked to the Australians with respect to this particular matter and they are rather adamant; in fact, because of bluetongue they simply reject the importation of any ruminants into that country. This is based not as much on scientific fact but on the simple premise that if anything were to happen in so far as the introduction of bluetongue into Australia it would eliminate to a great extent their sheep industry which, in fact, would take their basic industry from them. Therefore they simply sweep the entire

North American continent into one large pot and say that we reject all the sheep and cattle from that continent because of the existence of bluetongue in the United States, and because of the interchange of cattle and sheep between the United States and Canada.

Senator Hays: In the field of research as far as animal diseases are concerned then there is a great problem of getting these people to accept the fact that we do know what we are talking about and that we have isolated this sort of thing.

Dr. Wells: No, it is not a great problem, Mr. Chairman; generally throughout the world as a matter of fact we in Canada because of the health status of our livestock can and do ship livestock to more countries in the world than any other single country and this is because we are accepted on a world wide basis as a very efficient country in so far as the control of animal diseases.

Senator Hays: Yes, I realize that.

Dr. Wells: Australia is one nut that we have been unable to crack.

Senator Hays: It is probably a political problem; maybe you had better not answer that.

Dr. Wells: Britain, as an example Mr. Chairman, is recognized as totally free of blue-tongue and yet because the British import cattle from Canada recognizing our position with respect to bluetongue the Australians in turn refuse the importation of the livestock from Britain to Australia.

Senator Hays: The other two questions I had, Mr. Chairman, one was the related costs of research in the agriculture department with the United States; I think you said ours was \$38 million?

Mr. Williams: No; I said our operations and maintenance services was \$34.7 million.

Senator Hays: That is of about \$50 million?

Mr. Williams: For the current year it is about \$42 million, I believe.

Senator Hays: And what is the United States?

Mr. Williams: I am afraid we will have to report on that, sir.

I might say it is a somewhat different situation; it is not quite as simple a question

as that, because of the varying responsibilities at the federal and the state level and at the university level, and the way their research is deployed as compared with ours, but we will obtain that figure.

The Chairman: The contribution of industry in the United States is much more important than here.

Mr. Williams: That is correct, yes sir.

Senator Hays: The other question I should like to ask is about information to the farmers: the Department of Agriculture does a fantastic job in so far as insecticides, new varieties, and all of the sciences. I think that we do in Canada about as good as anyone, but we are not getting this across to our farmers at all. For instance, I think Manitou wheat is a good example, or Galt barley; it takes us years and years to get through to these farmers. Even though they might benefit by ten or fifteen bushels to the acre, the mass media do not get this through, the research people do not get it through, the provinces who are charged with this responsibility apparently are ineffective. It has been reported in some American journals that most of it is done by neighbours and I believe this is true. If you have a leader in a community it still takes two or three years for it to dribble through.

How can we resolve this position with all the money we are spending and we are not getting it through to these people? How do you propose to attack that? You mention it in your farm management service; this may be it.

Mr. Williams: Well, sir, I think that the approach that we follow and that we have to continue to follow varies greatly from province to province. The extension services, and I believe it is mentioned in the brief, vary in sophistication and efficacy depending on the province. There are provinces in which one could go at the present time and you would find that the federal people were doing a considerable amount of extension; in other provinces, where the extension service is more highly developed, our people are only very marginally associated with extension operations.

The approach that we are trying to follow is that we are working with the provinces through our co-ordinating committee on agricultural services to try and with them determine what their major problems are; we recognize that extension is a responsibility of

theirs and I may say one that they guard rather zealously. We are working with them to try and see how we can best co-ordinate our effort with their effort and, as I mentioned also, at some places we do have their extension people located on our research stations.

Our information division is now taking part with joint committees with the provinces as to how best feed the information to the farmers' advisers.

We have a continuing co-ordinating effort through the biannual meetings of senior officials of the provincial and the federal departments at which these matters are considered and at which we try to fit in with their plans.

I may say, sir, that we have considered other approaches and we do in some areas follow these approaches, depending upon the attitude of the province and depending upon the resources that we have. We make our people available to the provincial people, through the provincial organization. Our specialists are available at all times; they attend meetings; they speak to farmers' groups. We have groups that visit our farms, that visit our research stations.

I would think that I would have to say however, and I do no more than agree with you, that there is a problem here and it is a problem we are working on, but as yet we do not have any one really satisfactory solution to it.

I think that the situation is improving as communications improve, but I think I have to go back to the fact that probably our biggest area, the biggest means by which we can contribute will be through this new national farm management service that will be implemented, as I said earlier, brought into effect on a trial basis next year.

Senator Hays: Thank you, Mr. Chairman.

The Chairman: But has there been any research devoted to this problem? I suppose that it would be mainly experimental research on the best ways of communicating with the farmer?

Mr. Williams: Dr. Purnell, will you answer that, please?

Dr. Purnell: I will try. Mr. Chairman, the sociologists and agriculture economists have teamed up to do research on the adoption of innovations, adoption of new technology and human beings with the nature that they have

are reluctant to adopt immediately new practices, even though they are proven to be economically sound in experimental programs.

They take the attitude that it looks good on paper but we want to see it work out in the commercial sector. The studies have shown that farmers are adopting new practices at a much more rapid rate today than they did when, for example, hybrid corn was developed and distributed to farmers.

We get about 25 per cent of our farmers that will adopt a practice in a general sense within the first five years. Now, I am sure that Senator Hays feels that this, and we as well feel, that this is rather slow. The other 75 per cent of the farmers adopt even at a slower pace and that really is a relatively slow pace.

The Chairman: But what are the motivations? For instance, if what Senator Hays said a moment ago is true, that most of the diffusion happens through advice from a neighbour, then it would seem to me that all the money you spend for instance on communications and on your radio broadcasts, and all this, may be just a waste.

Dr. Purnell: If I might comment on that: I would just say that the early adopter or the innovator must hear of it first, and this department then and the provincial departments of agriculture are certainly instrumental in getting this information to these early adopters, the innovators.

The Chairman: Who is that innovator? Would you describe him?

Dr. Purnell: They are the more aggressive, advanced type of farmers, who are looking for new ideas. Many of them are not really willing to wait for the extension worker to bring him information; they come to the research worker to find out even before perhaps the research results are really available.

Some of these people come right to the research worker to obtain this type of information; they go out, put this information into use, the neighbours observe and in years hence have similar practices.

Senator Thompson: If you accept this premise of Senator Hays that it is true that it is through a neighbour or a leader in the community, why do you bank so much on your computer where you are going to get a national look at the picture, I presume; you mentioned it had comparisons.

Why do you consider that this is going to be so effective in helping efficient farm management? Surely it would be, if you are saying that a leader or a neighbour does it, much better to be working with the individual prominent leader in agriculture through the personal contact of extension workers?

Dr. Purnell: Mr. Chairman, to a degree that is definitely correct. However, I did mention that even the early adopters, that is this 25 per cent, take several years in some cases and depending upon the type of technology that is available to them, to adopt this practice, then the others follow even later on.

Now, if we have a personalized service in the form of a national farm management electronic accounting program, this means that an individual who may have previously waited for the early adopter to pick up the practice and put it into use will have an opportunity to have his own operation evaluated to determine what weaknesses and strengths he has in his decision-making practices, his management abilities on the farm, and he will be able to see after the evaluation of his records comes back to him and in co-operation with the adviser, just exactly what he needs to do to improve at an early date.

Senator Thompson: I have a little farm outside Toronto; I really could not classify myself as a farmer.

The Chairman: You are in the category of Mr. Walter Gordon.

Senator Thompson: No, I am in no way in that category.

The Chairman: Except that he raises sheep.

Senator Thompson: I would like to be; but I remember when I was asking, I grow trees, so you realize the category I am in and I hope you will not be too scornful of me in spite of my trees, but when I asked for advice on the management of this I must say I was very gratified to have a small army of people come out to advise me personally with respect to this. I feel that that to many farmers, if that personal touch by the agricultural representative is not getting through, I fail to see how we can place our hopes on the cold, sterile computer reports.

Mr. Williams: I think probably one of the most important points about the approach that I have spoken of in the farm accounting and management system is that there would

be a continuing personal contact with the farmer. We are not expecting under this system that the farmer is simply going to mail off reports and get back, as you say, cold, hard statements printed out by some computer without anybody being there to interpret them for him. There will be a continuing personal contact by a man trained to assist this farmer with his problems and we believe that through that means the objective that you are mentioning will be reached. There is, of course, a very serious problem of resources here.

While we are still on this subject, Mr. Chairman and gentlemen, I would not like to leave the impression that the Department of Agriculture feels that the farmers of Canada are by and large a backward group who are not willing to learn, who are not willing to take research findings into effect. This is not the case in our view.

There are problems in this area but I think that Canadian agriculture has proven itself in the world; we export about 30 per cent of our total agricultural production; we have probably the least subsidized and least protected agriculture of any advanced country in the world. I think the problem here is that of our 430 odd thousand farmers, I think it is 65,000 of them in the last census were classified as commercial farmers. So we do have a vast number of people living on the land who are technically farmers and who certainly farm and certainly produce a considerable amount of agricultural produce, but whose own resources cause them problems in respect of taking into effect innovations.

It is difficult to tell a man whose economic position is, shall I say, pretty well towards the bottom of the ladder, that he must buy a new sprayer and use a new spray technique, or use a new spray material when he is having difficulty feeding, clothing and educating his children.

So, while I am saying that we do have problems reaching the great mass of farmers with our research results, the problems are not all associated with the system in terms of the extension system.

I just felt that I should say that; we do not feel that our farmers are backward by any stretch of the imagination. We feel that those farmers that fall in the classification of commercial farmers are probably the most forward looking and most efficient of any farmers of any country in the world.

The Chairman: But you are spending, I understand, \$1 million on information each year?

Mr. Williams: That is correct, sir.

The Chairman: Do you evaluate, for instance, or try to measure the ratings of your broadcasts?

Mr. Williams: Yes, sir.

The Chairman: Are they fairly high?

Mr. Williams: In our view, yes sir; we have done some studies, for example, on where the farmer get his information, what motivates him to take action, to undertake an innovation. I think that almost without exception the farmer himself finds it very difficult to reach the decision as to which media motivated him, that it is a series, it is a build-up to information. His neighbour may say something to him; he may hear it on the radio; he may see it on the T.V.; he may read it in a bulletin. He may do it all four ways, or any combination of them before he finally takes the step.

In the studies that we have done, sir, we have found that he finds great difficulty in saying which one really motivates him to make a change.

The Chairman: But surveys of that kind have been made?

Mr. Williams: Yes, sir.

The Chairman: It would be interesting to get the results of this; is there any publication?

Mr. Williams: Yes I can provide the Committee with a publication in respect of the dairy industry in one area of Canada, where a survey was conducted and certain specific innovations were illustrated and the farmer was asked to indicate if he had done this, if he had a bulk tank, for example, was one of the questions and if he did have it, why he had it and what made him make the decision to get it.

Senator Thompson: And where he got the information.

Mr. Williams: That is the sort of thing, yes.

Senator Thompson: I take it Farm Forum and the CBC program, it seems to me they sort of linger to a dying death.

The Farm Forum, for example, is this still used? Have you examined the effectiveness of this?

Mr. Williams: The Farm Forum is not one of our programs.

Senator Thompson: I appreciate that, but you would use it as an information source.

Mr. Williams: As an information source, yes. The Farm Forum program I think is officially dead at the present time.

In respect of the \$1 million expenditure on information, I might say that this is not all on the promulgation of research information. We spend a great deal of our—I should not say a great deal; we probably have a breakdown of the costs, but I do not have it with me at the present moment, on the explanation to farmers of the various policies and regulations that affect him, as well as the research findings. We have a very major side of our department, for example Dr. Wells' health of animals people have much information they put out to the farmers that is not research findings; it is instructions to him.

A short recess.

UPON RESUMING:

The Chairman: Senator Belisle.

Senator Belisle: Mr. Chairman, I want to thank you for giving me the opportunity to ask a few questions. May I be permitted to say that you are such a hard worker that you are piling onto us many very important briefs with which we should have more time to deal in order that we might do full justice to them. It is not only a question of having time to read them but also having time to digest them.

The Chairman: Your criticism is noted.

Senator Belisle: Nevertheless our distinguished guests will understand our many other obligations, including social obligations, and they will give us their kind co-operation even if we ask questions which may not really be in the light of great wisdom or knowledge. May I repeat that this is a complete brief and I am very pleased to say that you gentlemen made a good job of it. Naturally, it is my job to try to put a few holes in it, and I will try my hardest to do so.

First, let me deal with the current investigation into agricultural research. I will try to make my question as detailed as possible. Who is co-ordinating this investigation?

Aside from the Senate committee's investigation, which it undertakes as part of its study on science policy, there are two major studies of agricultural research. First there is the Science Secretariat agricultural study which was set up in order to obtain an objective examination of the status and structure of research in agriculture and to set guidelines and recommendations for its future direction. The study group is charged with appraising, evaluating and making recommendations on the current status and adequacy of agricultural research in Canada; assessing the trend and needs of Canadian agriculture and making recommendations on the allocation, organization, management and co-ordination of the national effort including all components.

Secondly, there is an agricultural task force which was set up by the federal Government with the concurrence of the provinces in 1967. The result of its examination of Canadian agricultural goals and policies will be published early in 1969. This is referred to in your brief at page 43, section 45.

This study will include the detailed assessment of Canadian policy in regard to research and education as well as many other items.

My first question is this: are these studies co-ordinated? If so, by whom?

Mr. Williams: In so far as the task force on Canadian agriculture is concerned, sir, they are co-ordinated through a committee of Cabinet that was established when the task force was first authorized. This committee, which meets on approximately a monthly basis, has reviewed all aspects of the work of the task force to try to insure that not only did it meet its objectives, or was it aimed towards its objectives, but that it also would not interfere or overlap in other areas of study.

The Chairman: What is the name of that committee of Cabinet?

Mr. Williams: It does not have a formal name, sir. It is just a Cabinet committee. I could name the ministers who are on it. There is an interdepartmental committee as well which meets under the committee of Cabinet.

The other group to which you refer, sir, is one that is established by and reports to Privy Council. I am afraid, sir, that it is not within my competence at this moment to say

where its orientation fits in with the task force, other than to say that the task force is dealing with the broader area of agriculture as a whole, with research being a portion of this, whereas the group set up under the Privy Council is dealing solely with agricultural research.

Senator Belisle: Is there any possibility of duplication of research?

The Chairman: You mean of research on research?

Senator Belisle: Who co-ordinates the co-ordinators?

Mr. Williams: I think probably the best answer I can give you is this: The task force and the other group, the one under the Science Council, do have one senior member common to both. Thus it would appear to me at least that the possibility of overlap of work is reduced to a minimum. Each one is well aware of the work that the other is doing, and I can only presume—and I am afraid this must be a presumption on my part—that the actual work they have instituted is not in fact a duplication. I have not seen the reports of either one, so I cannot answer it fully as to whether this will or will not be. But I know they are in close communication. However, to give a hard answer to your question, there is no formal co-ordinating body.

The Chairman: Who is in charge of the task force?

Mr. Williams: The Minister of Agriculture. By that I take it you mean who is the chairman.

The Chairman: And who are those who are doing the work?

Mr. Williams: There is a group of five employed on a professional service basis. It consists of Dr. MacFarlane, chairman, a professor of economics at McGill University, Macdonald College. There is Dr. Gilson, head of economics branch of the University of Manitoba, there is Dr. Ralph Campbell of the University of Toronto, there is Dr. Thain of the University of Western Ontario and Mr. Comtois of a management firm in Montreal.

Senator Hays: Are any of them farmers?

Mr. Williams: No.

Senator Belisle: Does the Minister of Agriculture meet with them from time to time?

Mr. Williams: Yes, once a month. They meet in addition with the interdepartmental committee which meets once a month. I might say in further explanation that this task force is commencing studies and is preparing an interim report. This interim report is due to be ready next month and the Minister of Agriculture has announced a major agricultural conference to be held at the end of March. At that conference where there will be very large representation from all segments of agriculture, including farmers, the task force will present its preliminary results. Actually they will be presented ahead of time. We anticipate having the reports out two months ahead of the conference. Based on the conference, the task force will then write a final report. Meanwhile they have had extensive consultations with farmers and farming groups in all phases and segments of Canadian agriculture.

Senator Belisle: You may have answered this one broadly, sir, but it is not quite clear to me yet. Where do CASCC—the Canadian Agricultural Services Coordinating Committee—and the Science Council fit in together?

Dr. Woodward: Mr. Chairman, the Science Council Committee, of which Dr. Smallman, sitting over there, is chairman of the study group, is a one-shot *ad hoc* body set up to make a thorough study of agricultural research and to bring forward recommendations on it.

The Canadian Agricultural Services Coordinating Committee is a continuing one and, as you will see in the brief, it includes the provincial Deputies, the Deans of Faculties of Agriculture, the directors of provincial Agricultural Research Councils, and our National Research Council. It has carried on a continuing study of the needs of agriculture and of the needs which require research, and it has a continuing overview of the studies that we are doing. For example, our inventory was done under the auspices of the CASC Committee, and other studies we are doing are done under its auspices.

In addition, this committee has the job of making all those who are involved really co-ordinate the total agricultural research in Canada—not just the federal research—and to indicate where we should be pulling in our horns, where we should be putting more effort toward the solution of particular problems, and more work in particular areas. It also has the responsibility of putting its finger on where there are serious gaps in our

present program. So, it is really a continuing group.

Dr. Smallman's committee has had an opportunity, and has certainly availed itself of the opportunity, of discussions with and reference to all the records and reports that have emanated from CASCC, which is doing a continuing job, while Dr. Smallman's assignment is to take a look at agricultural research at this particular time.

Senator Belisle: The reason I asked this question, sir, is in light of the evidence, that you said on page 1 of the brief:

Clarification of CASCC responsibility in the agricultural sphere relative to that of the Science Council is also required.

And the brief is not clear. I believe those who wrote the brief were not clear in their thinking as to what they meant.

The Chairman: You were not clear about the clarification?

Dr. Woodward: If I may, I think what we were really thinking of here is that the Minister of Agriculture has a total package for agriculture, of which research is a very important integral part; and that we cannot isolate agricultural research and consider it just in relation to the resources we are committing on Space and Defence research. Agricultural research must be considered in relation to the overall needs of the agricultural industry, irrespective of what we are doing in Space research or in Defence research. I say "irrespective." I am talking about a mission-problem oriented-line department such as the Department of Agriculture.

The Chairman: Surely, you must adjust to overall Government policy.

Dr. Woodward: Of course, what comes in here is what the Government can afford to spend, but I do not think we should look at this simply—after all, there is a need for agriculture, and there is the total package for agriculture. As Mr. Williams, pointed out, there are many facets to the work of the department, and many things involved, and there must be a relationship here as well as a relationship between agricultural research and space research.

The Chairman: But to come back to Senator Belisle's question, what is the clarification that is required in the relationship between CASCC and the Science Council?

Dr. Woodward: I think the relationship requires us to know how much responsibility CASCC will have in recommending how much effort should be put into research as compared to the total agricultural effort...

Senator Hays: Are you talking about the Agriculture Task Force?

Mr. Williams: No, the Canadian Agricultural Services Coordinating Committee.

Dr. Woodward: —as compared to the Science Council's responsibility in recommending how much money should be spent on agricultural research as compared to, say, defence research.

Senator Hays: But, you have a man concerned with agricultural research on the Science Council?

Mr. Williams: No, not on the Science Council.

Senator Hays: But on the N.R.C. you do?

Mr. Williams: No.

Senator Hays: Do you recommend that? Do you think that should be?

Mr. Williams: I do not think there is any particular problem there, in that we do have the N.R.C. represented on the Canadian Agricultural Services Coordinating Committee. If you turn to page 9 of the brief I think you will see that the role and function of CASCC is clarified there. CASCC itself has no statutory authority. It is a group that meets voluntarily, and it consists, as you will note, of the deputy ministers of agriculture, federal and provincial, the deans of the faculties of agriculture and veterinary medicine, the federal assistant deputy ministers of agriculture, the directors-general of our branches, the director of the agricultural division of the Dominion Bureau of Statistics, the director of bio-sciences of the National Research Council, the director of the Agricultural Research Institute of Ontario, and the president of the Quebec Agricultural Research Council, and as observers, there are people from the Science Secretariat.

Now, CASCC itself co-ordinates a great deal more than simply research. All phases of agricultural policy are dealt with in this group. This group makes recommendations to meetings of the federal Minister of Agriculture and the provincial ministers of agriculture, who meet at least twice a year.

I think that what we are trying to say here, sir, is that we believe that the role of CASCC is to co-ordinate agricultural research, and to make recommendations through the Minister of Agriculture, and through the provincial ministers of agriculture, in respect of direction and amount of agricultural research. We feel that the role of the Science Secretariat—if I may be pardoned the liberty of commenting on that—should be to recommend the allocation of resources between agriculture and other segments of science activity. This is the role we would like to have clarified, sir.

Senator Belisle: Mr. Chairman, my other question is this—and I am referring to page 44 of the brief, where it is stated:

In the Grain Research Laboratory, there has been a series of four Review Committees appointed by the National Research Council at the request of the Board of Grain Commissioners.

In the light of what you said, and what is said in the brief, how do CASCC and the Science Council fit in? In other words, who co-ordinates the co-ordinators?

Mr. Williams: If I could talk about this problem in respect of the grain research laboratory, one has to go back into history a little. The grain research laboratory has not always been with the Department of Agriculture; it was with the Department of Trade and Commerce, and it was at that time that those committees were set up. At the present time the approach is that these committees established under the National Research Council, because of the changed responsibility of the Board of Grain Commissioners, are now being transferred to the Department of Agriculture and will be co-ordinated through CASCC.

The Chairman: If I understood you aright, you would like the Science Council to more or less define the size of the total pie, and then also more or less divide that pie into different sectors of research, and once a budget for research in agriculture has been determined by the Science Council you as a department with CASCC would like to be left alone to be able to determine the utilization of that sum in terms of your research programs and projects.

Mr. Williams: Putting it very briefly, yes, other than this, that I think we would also like to have some say in making recommendations on the cutting up of this pie. In addition to that, I do not think we want to be

quite left alone in that sense of the word. We wish to have them continue with our CASCC in the role of observers. We are not trying to do the work in darkness or anything of that nature.

The Chairman: You have a representative on the Science Secretariat but you do not have any representative from CASCC on the Science Council.

Mr. Williams: That is correct, sir.

The Chairman: The Science Council, under the terms of its own act, has the responsibility of advising the Government on the overall final policy.

Mr. Williams: That is correct, sir.

The Chairman: So there is no direct link between CASCC or the Department of Agriculture and the Science Council?

Mr. Williams: That is correct, no direct link, sir.

Senator Belisle: I should like to ask a supplementary question on what Senator Lamontagne, our Chairman, has said. You suggested that you would like to have some say in cutting the pie. Do you have a direct way of suggesting how much of the ingredients should be put in the pie, or more plainly how many dollars you request to make the pie, apart from the Minister of Agriculture?

Mr. Williams: I guess my answer would have to be no, we do not have any direct way.

Senator Belisle: Your only connection with the Cabinet is the Minister of Agriculture?

Mr. Williams: That is correct, sir.

Senator Belisle: And they are at liberty to accept or reject recommendations made by these three councils; you do not make them apart from to the minister?

Mr. Williams: I am sorry, I do not follow the question.

Senator Belisle: You do not make your recommendations to any other source than the minister.

Mr. Williams: That is correct, yes.

The Chairman: You are the chairman of CASCC, of course.

Mr. Williams: That is correct, sir.

Senator Thompson: I am interested in this. There is another co-ordinating body, the Economic Council, which is taking a look at your research and the effect of it, and making recommendations. Did you prepare that paper for them or did they do it on their own?

Mr. Williams: They did it on their own.

The Chairman: Without any consultation with the department?

Mr. Williams: I cannot answer that. They have talked to people within the department, but there was no consultation at the official level.

Senator Belisle: My other question deals with the relation between the federal Government agencies regarding the agricultural research. First, on page 2, paragraph No. 11, you see:

The major hindrances to more effective performance stem from (a) lack of a more precise definition of responsibility, (b) the demands of informational services and *ad hoc* investigations—

and you continue on. Further down you say:

the need of a central mechanism—is a fundamental requirement for co-ordination of agricultural research and development—Clarification of CASCC responsibility in the agricultural sphere relative to that of the Science Council is also required.

Could you give me more detail?

Mr. Williams: I think I will ask Dr. Woodward, sir, to speak on that matter. What page are you referring to?

Senator Belisle: Page 2, article 11, and also page 7, paragraph 1 of the recommendations.

Dr. Woodward: Certainly, sir, we were thinking here that we have a joint responsibility for research between the federal Government and the Canadian provinces and I think perhaps the term that we used “the major hindrances” is a negative term. I think what we were trying to get at was we think we are doing a pretty good job with CASCC, but we think that we should strive to do a much better job and that we could do a much better job than we are by co-ordination. In this particular area, if we are thinking of getting on as a line operation with a job, a central responsibility is a great asset. Now, with the organization in agriculture we have a joint responsibility. I think this was the

point, that these recommendations are made from the standpoint of research and development.

The Chairman: When you were saying “lack of a more precise definition of responsibility” were you referring to a responsibility as divided between federal and provincial governments or division of responsibility between the different research agencies of the federal Government?

Dr. Woodward: I think we were thinking between the federal Government and the provinces, sir.

Senator Belisle: The other question is taking you back to page 31.

(i) Federal agencies:

The National Research Council. Relations between the department and the NRC during the formative years—

and you continue on. What about the present? Are they better?

Dr. Woodward: I think we have excellent relations with the NRC today, sir, and we have not any of these problems that arose in the early days when Mr. Grisdale was taking some umbrage at the terms of reference to the NRC, because today through precedent, we have a working relationship where the primary responsibility for agriculture is with the department and primary responsibility for the secondary industries with the National Research Council. For example, let us take the field of food research. The primary responsibility today for food research lies with the Department of Agriculture for food uses of agricultural products. The primary responsibility for non-food uses, industrial uses of agricultural products, lies with the National Research Council.

The Chairman: How can you make that distinction operational? It is nice in terms of logic, but, in terms of program and projects?

Dr. Woodward: I think we are working with the NRC and working with its committees and even more with our day to day relationships between our senior officers and senior officers of the National Research Council and also at the working level. Our relationship is excellent with the NRC and we do support each other in research, for example, our use of N.R.C. equipment over the years has been of great assistance to us and they have the expertise in certain areas which has been of great assistance to us.

Senator Belisle: Still on page 31, you say "associated committees". What do these do?

Dr. Woodward: These committees were set up a number of years ago. As Mr. Williams has pointed out, this was a time when the Board of Grain Commissioners was in the Department of Trade and Commerce. Originally in the National Research Council there was considerable work on cereals which there is not today. For example, Dr. Hopkins was the leading statistician in the Research Council and was one of the very able statisticians in Canada, and he had compiled valuable statistics in relation to grains.

These committees were set up under the auspices of the Research Council to bring together the interest of the Council with the interest of the universities and the interest of the Department of Agriculture and the Department of Trade and Commerce. They met under the auspices of the N.R.C. As Mr. Williams has said, the Council has asked us now to take over these committees and they will be coming to the Department of Agriculture as of April 1, 1969.

The Chairman: On research devoted to the use of agricultural products, how many federal agencies are involved in that research? You mentioned the Department of Agriculture so far as food is concerned and the N.R.C. for other uses. I am sure there are other federal agencies involved? The Department of Consumer Affairs?

Dr. Woodward: No.

Mr. Williams: No, sir, it is just two agencies.

The Chairman: Health and Welfare?

Mr. Williams: Health and Welfare, in respect of their regulatory work may do some research work, not on the utilization of the products but to be associated with methods for pesticide control and things of that nature, helpfulness in the general area. It is not a development work aimed at the use of products but rather support of their regulatory obligations.

The Chairman: And the Department of Industry? I am sure they are involved, in giving grants to industry?

Dr. Woodward: Yes, they have the job of promoting development in the agricultural industry and they have grants for research, for example, on rapeseed.

The Chairman: Is there any co-ordination of this work with the Department of Agriculture?

Dr. Woodward: Yes, sir. Our experts, of whom there are several on rapeseed, have been consultants to the Department of Industry.

Senator Belisle: How much work in agriculture does N.R.C. do and how are these associate committees connected with CASCC?

Dr. Woodward: They will be under the auspices of CASCC as of April 1969. In the past the associate committees, the ones listed here, were under the auspices of National Research Council and co-ordination with CASCC was through common membership of CASCC and on these associate committees.

Senator Kinneer: Mr. Chairman, I would like to bring this down to a regional level and speak of the Niagara area or all of southern Ontario.

Over the past few years we have certainly noticed in the Niagara area the loss of fruitlands to residential and industrial development. Have you done any research on soil that would be good for growing fruit in areas other than the Niagara or southern Ontario region? I would like also to mention the area along lake Erie, where there is some farmland where they are growing peaches. I think it is so important that we do not lose the fruitlands in the Niagara district that research should be provided to find whether it is possible to grow fruit—specifically, tree fruit—in other areas. Have you done anything along those lines?

Mr. Williams: Yes. I would say we have very extensive knowledge in respect of soil capabilities through that entire area. The major limiting factor in growing soft fruits is climate. We do have very extensive records of climate. The problem is largely associated not with the average climatic conditions but with the extreme climatic conditions, and I would say that we do have a background of material on that. I am sure that you realize, madam, that the locus of soft fruit industry is tending to shift at the present time. It is of interest to note that even though there is some erosion of original lands to uses for industrial and residential purposes, our production of fruits has not tended to drop off.

Senator Kinneer: Would you care to name the areas?

Mr. Williams: I am afraid I could not name them exactly.

Senator Kinnear: I am terribly interested in this, as all of Canada is, I am sure, because it is information which never gets to the public. If there is a possibility of other areas, I think we would be very interested in knowing where those areas are.

Mr. Williams: We will be pleased to obtain that information for you.

Senator Kinnear: Thank you. Now, do you consider that pollution is having any effect on the cattle industry? There has been considerable discussion, with reference to the Lake Erie area, about animals dying from pollution from some of the local factories. Have you done any research on that?

Dr. Wells: We have not had brought to our attention recently any serious problems in that area. A year or two ago there was a problem of suspected fluorosis.

Senator Kinnear: What did you find out about that?

Dr. Wells: We did not do any specific research with respect to it, but what investigation we did do did not show that there had been any very strong, or even any serious, influence with respect to livestock production as a result. This is not the case, of course, in the northern part of Quebec where there has been a considerable problem of fluorosis from the aluminum industry. But, even so, this has been cleared up to a large extent by the actions of the company involved.

Senator Kinnear: I think of course that closing down a part of their plant for the summertime and when the animals are in pasture—and we would like to see something done about it so that it is safe to run the industry and also allow the animals to pasture.

Senator Thompson: Would this come under provincial jurisdiction?

Dr. Wells: Pollution doesn't come under our jurisdiction specifically except where it is brought to our attention that it does involve livestock production. Then we become concerned to the point of ascertaining what the damage is and what is causing the damage.

Senator Thompson: The reason you had not directly done research on this is because it didn't affect livestock production?

Dr. Wells: Yes, but the correction of pollution problems is not, of course, our responsibility.

Dr. Woodward: I might add, Mr. Chairman, from the research standpoint that we have good information on the effect of fluorine on the ruminant and we know the levels of fluorine that will cause conditions that will affect the health of the animals.

Mr. Williams: I might also add that we do have research on other aspects of pollution such as the flecking of tobacco and the bronzing of beans in that area.

Senator Kinnear: The length of Lake Erie which is the garden of Canada is such that it is important to protect the soil. This refers particularly where fruit is involved. It seems to be difficult to change over. I think there are areas of Lake Erie which would be just as good for fruit production as is the escarpment.

Dr. Arthur J. Skolko, Research Co-ordinator, (Plant Pathology) Research Branch, Department of Agriculture: Referring to the question of hardness, we have a very big program concerned with peaches and other soft fruits at a research station with a view to developing this.

Senator Belisle: When you are asked to do research in a new field, do you take cognizance of the fact that the provincial Department of Agriculture has probably made a very thorough study of that field? And do you take advantage of that?

Mr. Williams: Invariably, sir.

The Chairman: Before going on to Senator Robichaud's question referring to this regional distribution of research effort, you state for instance at page 5 that of the total budget which is devoted to agricultural research and development the universities and the provincial governments contribute 25 per cent. I wonder if you could obtain for us later—I know you don't have them now—the figures as to what is the separate provincial contribution and if it is available by province.

Mr. Williams: We will endeavour to obtain that information for you.

Senator Robichaud: Mr. Chairman, I have a brief question to ask of Mr. Williams. If I understood you correctly, Mr. Williams, you mentioned the brief as recommending an early increase in staff of approximately 3 per

cent which will mean from 10 per cent to 15 per cent more expenditures. We all know that in recent months agreements have been signed between the federal Government and certain provinces under ARDA or FRED programs which will involve major developments. I refer particularly to an agreement signed with the Province of New Brunswick in the fall of 1966 involving the expenditure of some \$89 million or \$90 million; the one signed earlier this year with the province of Quebec involving major developments in the Gaspé area; and there is one under discussion now regarding Prince Edward Island. All those programs will naturally involve agriculture, and will necessarily mean additional work from the research staff of the department.

My question is: Where are the funds which will be needed for this additional research to come from? Will they come from the appropriations of the department, or will they be provided by special funds made available through ARDA for the implementation of those FRED programs?

Mr. Williams: The short answer to that is: Both. If the program that is required in respect of the special development areas to which you have referred is one we would normally consider as part of our on-going program at the research stations in the area, or adjacent to the area, it is funded in the Department of Agriculture. If there are special and extraordinary areas of activity required that are directly associated with the project itself, and cannot be considered to be the normal on-going work we would plan for in the existing sense of the word, it is funded through the FRED fund itself.

Senator Robichaud: Are steps being taken to avoid duplication of staff? Is ARDA taking full advantage of the staff being made available through the Department of Agriculture, or are they adding to their own personnel, particularly in research which is affecting agricultural development?

Mr. Williams: I would say that in so far as ARDA is concerned the only possible area of overlap or conflict, if you wish, is in the area of economics and economic studies, but in terms of operational and biological research, there is no overlap, they do not employ personnel in this field. They do have economic studies done and economists of their own. I think, however, that this overlapping—and I must admit there is bound to be some—is kept to the very minimum through

the development of liaison groups consisting of federal and provincial groups. For example, I am on the one for the BAEQ area in the Lower St. Lawrence. This liaison group is responsible for approving all projects within it, and the people within it are quite knowledgeable in respect of the many programs.

In addition, we do have full-time employees, in some cases, of this department who are seconded to ARDA for the purpose of co-ordinating the work of the department and the work of ARDA.

Senator Hays: Has there ever been a study done by the Department of Agriculture, or, if not, are they equipped to do a study or research on the equalization of freight rates across Canada for certain agricultural commodities—say, cheese or beef cattle?

Mr. Williams: To answer the second part of your question first, the answer is: No, we have never done any study on this matter. And to answer the first part of your question, I think at the present time we do have staff with the capability in this area.

The Chairman: Before we adjourn, I would like to refer to page 80 of the report, where you say:

It is not possible to break down the total expenditures on a scientific discipline basis.

I should like to ask two questions about this. First of all, I understand that the DBS is publishing figures by departments and according to disciplines—the two main categories of disciplines being the physical sciences and the life sciences. So, surely, you must have kind of figures on that subject.

Furthermore, I am wondering if you could also provide some figures as to the division of your research program between fundamental or pure research and applied research and development work, because again I think DBS is publishing figures in this respect on the basis of departments, and somebody must be supplying DBS with those figures.

Dr. Woodward: Mr. Chairman, our program is a problem-oriented program, and we have a multidisciplinary approach to problems.

The Chairman: Yes, I know that.

Dr. Woodward: Our whole programming—our planning programming, and budgeting, and our forecasts—is established on the basis of problems in relation to particular animals or soils; rather than disciplines.

The Chairman: I know that, but—

Dr. Woodward: If we are thinking of disciplines such as chemistry, physics, mathematics, or biology, then our whole approach does not lend itself to an accounting on the basis of disciplines.

Dr. Skolko: I think DBS shows the amount for agriculture not broken down.

The Chairman: Are you sure of that?

Dr. Skolko: Yes.

The Chairman: And there is no distinction in the DBS figures between fundamental and applied research and development work?

Mr. Arthur Robert Manery, Co-Ordinator of Economic Projects, Department of Agriculture: I do not think so.

Mr. Williams: What I think we can provide for you, however, is an estimate in terms of numbers of professional people, and we can then apply some sort of figure per professional person—that is, those whose background is chemistry as opposed to those whose background is entomology. We have those figures, and we can lump the biological sciences and the physical sciences together in that way, and then make a segregation.

The Chairman: At page 5 you say that 14 per cent of the money you spend is devoted to research on general biology. Well, at what level of research is this? Is this biology, or—

Mr. Williams: I shall have to ask Dr. Skolko to explain that breakdown, and tell you what the sub-items within that category of general biology are.

Dr. Skolko: These figures were taken from the 1966 Inventory of Agricultural Research Projects—the yellow booklet—and the general category of biology includes the residual research that could not be attributed to any of the other fields listed here. In other words, they were so broad in their application—

Mr. Williams: In other words, they would cover work that might involve a complex of animals on pasture where part of it is crop research and part of it is animal research, and it could not be subdivided into the first three groups.

Dr. Migicovsky: And cellular research, which would be applicable to all kinds of plants.

Mr. Williams: We will endeavour to get those figures for you.

The Chairman: We shall meet again after lunch. Thank you very much. We will adjourn until 3.30 this afternoon.

The committee adjourned.

AFTERNOON SITTING

(Afternoon session)

The Chairman: Before we go back to Senator Belisle, I would like to refer to the questions I was asking at the end of our meeting this morning.

I have here a DBS publication which shows figures for the Department of Agriculture, dividing the research budget of the department between basic research, applied research and development for the year 1965-66. Since we were told this morning that the department had no such figures, I do not know where they come from. Could we have an explanation of this?

Mr. Williams: Yes, sir; you can have an explanation, but not right now, I am afraid, because I have not got the figures with me. But if those figures were supplied for 1965-66 we certainly can supply them for the current year.

The Chairman: Yes, but we have to assume that they come from your department.

Mr. Williams: Yes, sir. I am afraid all you can have from me is an apology, not an explanation.

The Chairman: So I will have to come back to this later, because if you are not in a position to comment now on these figures since you have not seen them recently, it would be difficult to ask you questions on them.

Dr. Woodward: Mr. Chairman, there is a breakdown in this report on page 76 on disciplines of recruitment which would partially answer your query, but not as regards basic, applied, development and research.

The Chairman: Yes; I suppose we will have to defer this.

Dr. Skolko: I could refer you to page 80, Mr. Chairman, where there is a breakdown on intramural R and D and other expenditures in the department.

The Chairman: Yes, but there is no breakdown of the R and D figures.

Dr. Skolko: No.

Mr. Williams: We will obtain them for you, sir.

Dr. Skolko: The only other reference that I can make is on the expenditures based on regional and national spending, on page 62. These, admittedly, are based entirely on whether the expenditure is made at a research station or at an institute.

Now, the institutes in general have a more basic program of research as opposed to the regional research program. This is a very approximate figure, of course, because these are not strict separations, but it does give an indication.

Dr. Migicovsky: I think it should be added here, Mr. Chairman, that the terms basic and applied research have been used very loosely by both DBS and every organization that has tried to do any kind of survey of research. It has been extremely difficult to get a definition that everybody agrees on.

Basic and applied research as we would look upon it in agriculture would probably be a very different proposition than if people at NRC looked at it, or any other departments. So I do not think the breakdown is a very meaningful one unless it is accompanied at the same time by exactly what is meant, because we are in a tyranny of words here and the semantic problem is the more serious one.

I have sat on many committees that were trying to do surveys and out of ten people sitting at a committee we got ten different definitions of what they meant by basic, applied, developmental research, and so on and so forth.

Therefore, I think the figures you have there are not worth very much from the point of view of information.

The Chairman: I think it would be highly interesting to know this, because if they are of no use then we will just eliminate them.

Dr. Migicovsky: They are of no use without a definition.

The Chairman: DBS has definitions; I do not know if they are accepted by the departments, but if they are not accepted by the departments then the figures based on these definitions are meaningless, as you say.

I think it would be useful for us to know to what extent they are meaningful or not.

Senator Hays: If you had a research program somewhere in the field, maybe a breakthrough in cereal grains, or some sort of thing that looked as though it was right on the edge of realization and that sort of thing and it was going to cost \$15 million, how would you approach this?

In Mr. Williams' submission he said he thought the growth would be 10 to 12 per cent per year and I suppose this would look after salaries and that sort of thing. You would take this to the Treasury Board from the Department of Agriculture?

Mr. Williams: The first thing we would have to do, sir, assuming the figure was not quite as large as the one you suggested, but assuming it was a figure within any proportion, the research branch themselves would have to see what they could do by re-allocation of resources.

Senator Hays: Well, the farm management one could well be one of those programs.

Mr. Williams: That is correct, yes.

Senator Hays: And it may be very useful if you had to spend \$25 or maybe \$50 million, I do not know. We have done crazier things in Canada.

Mr. Williams: The procedure that would be followed would be that the particular branch that had responsibility for the program would have to assess their programs to see what portion, if any, could be accommodated within their own budget by re-allocation of resources.

The next step would be at the executive level within the department to examine all departmental programs to see what priorities we are placing on different departmental programs and whether it is possible to re-allocate funds and/or people in order to meet this demand, presuming the priorities were such that we felt that it was at our top priority.

If we were unable to accommodate it within that structure we would have to approach Treasury Board to seek relief in terms of additional resources.

The Chairman: Senator Belisle.

Senator Belisle: I am going to continue the questions in relation between the federal government agencies regarding the agricultural research.

On page 38 you quote there:

The Agricultural Economics Research Council, an independent research agency, provide ample opportunity for duplication or co-ordination of program with the Economics Branch of the CDA.

Who funds the AERC?

Mr. Williams: It is a joint funding, sir, by the federal government, the provincial governments, industry and farm organizations. Within this department there is a separate vote that allows us to match provincial donations, or provincial contributions to this organization up to a maximum figure.

Senator Belisle: Thank you. Then another one: Does the CASCC not carry out this co-ordination, or the Science Council, or the Science Secretariat; could you relocate that?

Mr. Williams: The co-ordination and avoidance of duplication in the operations of the Agricultural Economics Research Council are carried on largely through representation on that body of people from the Department of Agriculture and from the provincial organizations who contribute to it.

I believe that at the present time we have three people from the department who are on the Board of Governors of the Agricultural Economics Research Council, sir.

Senator Belisle: You referred to provincial?

Mr. Williams: Yes, sir.

Senator Belisle: Would they assist by 10 per cent, or 15 per cent, or what figure?

Mr. Williams: Representation of people, or money, sir?

Senator Belisle: Of money?

Mr. Williams: I think about a third would be a fair guess; at the present moment we match provincial contributions basically, and the remainder comes from the producer organizations and from industry.

Senator Belisle: Thank you.

My last one on this subject is on page 48 of your brief you say we have indicated to the extent of actual and potential co-operation among federal departments and agencies with interrelated responsibilities. We believe that co-operation could be improved by clearer definitions of the roles of the CDA and other federal departments and agencies whose programs directly affect agriculture.

My question is this: How many federal departments or agencies fund agricultural research? Is there much overlap in your thinking?

Mr. Williams: You are asking there, sir, for an opinion as to whether there is much; I think my view would have to be that there is not much overlap.

I think I indicated this morning that in so far as the biological sciences are concerned there is essentially no overlap. In so far as economic research there is an area in which the responsibilities are not as clear as they might be.

The responsibility for a major area of possible overlap here lies between ourselves and the Department of Forestry in respect of their ARDA and FRED operations, where they do, either on an inhouse basis or on a contract basis, conduct a considerable amount of the economic research associated with agriculture.

Senator Thompson: Mr. Chairman, my first question is really going back to the questions raised by some of the others this morning and this was the means of changing practice where you say you spend a million dollars on communications.

I was interested, and I am quoting from the Challenge of Growth and Change, the Economic Council's chapter on productivity in agriculture and they are describing crop yields and they were saying on page 90 that faced by excessive production in the late 1950s the U.S. government paid farmers to take land out of grain production. This in turn is likely to induce farmers to increase crop yields on the remaining acreage and to feed more grain to livestock.

Then they state: On the other hand, the Canadian government utilized a system of grain delivery quotas, essentially based on grain acreage, and this in turn may induce farmers to increase their farm acreage and invest more heavily in mechanization.

Then, as I read on, I find that the U.S. in crop yield, that they had accounted for over 170 per cent and this had more than compensated for the negative effects of acreage reduction and shifts among crops while in Canada that higher crop yields accounted for 70 per cent of the estimated expansion in crop production.

They also in further pages suggest that in the U.S. the reason why they are ahead of us in crop yield is because of mechanization and

they list a number of things, greater fertilization application, better disease and weed control, and areas in which you are far more acquainted than I am, but if I could just follow on this and with this I would hope that perhaps you would comment on it, they do make a comparison between the research facilities in the United States and in Canada, and a suggestion that really perhaps we are not putting as much in proportion to the United States into wheat or grain research.

They talk, for example, again of continuing research in production and marketing of all grain crops as needed to anticipate problems and find potential solutions before they become acute.

I wonder if I could just stop at that and ask for your comments on it?

Mr. Williams: In respect to the first portion of that statement, I might enlarge on it. This is not a matter of research policy, but rather a matter of over-all government policy. In the United States their program aimed at controlling production of the cereal grains is associated with taking areas out of production and providing a guarantee in terms of price on the crop produced on the areas left in production. This provides quite an incentive for the person that is farming the acres that are left in production to farm as intensively as possible; in corn they plant rows closer together, and the various factors that you read in there.

In fact, it tends to move towards a very intensive practice in the effort on the part of the producer to defeat the objectives of the program, namely to control production. Now, I should not say that he is doing it consciously to defeat it, but it moves towards the defeat. He is doing it in order to make a living really.

In the Canadian scene, however, we have not seen fit to control production in this matter; rather we have delivery quotas on cereal grains that are imposed by the Canadian Wheat Board. However, the delivery quotas are associated with what are known as specified acreage and the more specified acreage that a farmer has, the greater the amount of wheat he can deliver.

Now, this tends to produce an extensive type of agriculture as opposed to an intensive type of agriculture.

I must say, sir, that there are benefits and advantages to both; I think possibly the proof is in the pudding, in that our farmers certainly are competing on the world market with their wheat at lesser returns, shall I say, than their compatriots in the United States.

Senator Thompson: Have we not dropped from twentieth in wheat production in the world after the war and now I understand Canada is twenty-eighth?

Mr. Williams: Sir, it is not a case that we have dropped; it is a case that other people have increased somewhat. Our relative position has changed; that is correct.

Now, in terms of yield per acre, while I would not want to enter into a public controversy with the Economic Council of Canada, there is a little problem there in that they are lumping winter wheat and spring wheat together in both countries.

In the United States spring wheat represents a very small percentage of their total crop; in Canada it represents a very large percentage. If one presents spring wheat yields north and south of the border and winter wheat yields north and south of the border one will find that in both cases Canadian average yields are higher than those in the United States. However, when lumped together this does not show in favour of Canada, in that winter wheat is a bigger producer than spring wheat in terms of yield per acre and they have a much higher percentage. So it is a question of weighting here.

Senator Thompson: Another point of my question was that I can see, at least I sense a sort of sense, I will not say of frustration, but at least of impatience with respect to trying to change techniques by farmers, as indeed in any group of people, and you have pointed out that with the lack of financial resources a farmer has got to be persuaded that he is going to get a return before he will pay for new techniques, and yet it seems to me that where there has been government action, that is the United States saying O.K., you are having a less amount of acreage, there is the economic incentive, they are going to work as hard as they can to get a greater crop yield.

Can this apply in combination with other research, of the findings of research, inducement to farmers through government incentives to get them to apply the suggestions that you develop from your research?

Mr. Williams: Very much so, sir; I think that I tried to point out in my brief introduction that one of the major functions of our research branch is to provide expertise and advice to the policy-making arm, that is the broad agricultural policy-making arm of the department, in matters of this nature.

I think, sir, that one problem that we are talking about here is that there is no evidence that I know of that the United States farmer, despite these differences in policies, is able to produce a bushel of grain more cheaply than the Canadian farmer, despite the fact that their policies may have led to a greater production per worker which is, I think, the point that they are driving at there.

I think that what we are trying to work at as an ultimate objective is to produce human food of a top quality as cheaply as possible, not necessarily to feed the population cheaply, but in order that the farmer may have a profitable enterprise.

I mentioned this morning this difficulty that is associated with getting people to develop, to undertake improvements that are relatively costly to them because of their problems, because of their over-all economic position in our broad general economic picture. I might say as a matter of example when these are basically non-cost improvements, or very low cost improvements, the picture changes very significantly.

I think probably one of the best examples is a variety of wheat that was developed by our research branch. It is Manitou; it is an improved rust-resistant wheat, suitable for the rust areas of western Canada. It first was put on the market in 1965; in 1965 we were able to release 4,600 bushels of it, which is a very small amount in comparison to our total needs. In this current year some 13 million acres of Canada were seeded to Manitou wheat; that is better than 40 per cent of our total crop and it is estimated that in over 60 per cent of the area for which Manitou is well suited, farmers were growing Manitou wheat.

So you have here an innovation that is a relatively low cost one; he buys seed anyway, at least a great many of them buy seed. Not all of them do, some of them use their own seed, but if you have a low cost innovation it is taken up relatively quickly.

Senator Thompson: I appreciate this; you pointed out in this that the Economic Council

are grouping the spring and winter wheat together, that really they have not distinguished the whole picture in their presentation.

Mr. Williams: Yes; I would say, sir, that in so far as their presentation is concerned that is perfectly correct. There is nothing incorrect about their statement. However, if one starts to draw certain conclusions from them, those conclusions might be misleading.

Senator Thompson: Can I take another area, and ask you on it: While the proportion of cream shipments varied among provinces in all provinces except British Columbia milk production per cow is lower than the national average of the United States. Do you accept that statement?

Mr. Williams: I accept that statement but we are into, once again, a very serious problem of definition.

We have in this country and they have in the United States beef cows and dairy cows and they have beef cows being milked part of the year. I think that our dairy industry is probably not as advanced as it is in the United States as a whole and I suspect that the farmer is simply asked do you milk your cows. If they milk they are considered to be dairy cows.

In some parts of this country where there is a very mixed type of farming, these are beef cows that are milked for only a portion of the year.

I think that when one compares, for example, the herds that are on record of performance, which are dairy herds that are under an official testing scheme where we have accurate knowledge of their actual level of production, the comparisons are not invidious at all between ourselves and any country in the world.

Senator Thompson: Could I just follow this one last thing that I noted: it refers to these comparisons, and that is comparisons with the United States and Canada, it would appear that as in crop production yields, livestock production is below U.S. levels and that in some areas, for example dairy and cattle production, the gap is widening. These diverging trends probably reflect the many factors, including lags in the adoption of efficient farm practices and gaps in research and development in the livestock sector.

Animal research efforts in Canadian universities and in federal and provincial research institutions are proportionately smaller than the United States. Also a relatively much smaller volume of research in Canada is conducted by private industry than in the United States and it is not known to what extent this lack of private research puts Canadian yield technology at a disadvantage. If this gap in yield technology is to be reduced its causes must be more carefully identified.

Would you agree with that statement, or would you comment on it, let me put it that way?

Mr. Williams: I would certainly be pleased to comment on it and I would be completely incorrect if I did not agree with it as a broad generality.

I think to deal with the various points that are raised there, and I am not sure that I can recall them all quickly, in so far as industry research is concerned there is no doubt that this is a fact. I think that this is a fact that stems from our position lying alongside a very large neighbour to the south of us with much of the industrial research being done in the United States and being applied by firms operating on both sides of the border with their research being largely done at home, at home being the United States rather than in Canada.

Senator Thompson: Could I just take that as the first part: What efforts by the government, or by your department, are done to encourage industry to do research?

Mr. Williams: Our efforts I suppose as exemplified within the department are rather limited in so far as those products which by regulation, by law at least, we are required to regulate.

In general we require that the information provided to us by manufacturers must be of Canadian origin. For example, pesticides must be registered by the law of this land and must be registered by the Department of Agriculture. We will not register pesticides, for example, unless we have Canadian evidence as to their usefulness and their efficacy and safety.

Those are the major factors, but having said that, the basic research in developing that pesticide probably has been done else-

where. The other avenue, of course, is grants through the former Department of Industry, grants and tax concessions that are allowed by the Department of Finance in respect of research activities of Canadian companies but of course these do not come under this department.

The other point that you raised in that excerpt that you read, Senator, was the question of large animal research and the inadequacy of that. I am afraid, sir, that we as a department and the research branch must agree that this is correct; we are endeavouring to alter this. We are endeavouring to place increased emphasis on it, and if any of the members of this Committee, sir, might wish to do so we are developing a major complex just outside Ottawa in the green belt aimed entirely at large animal research. This is presently in the process of development as one step towards rectifying this imbalance that has existed in previous years and continues to exist I may say.

Senator Thompson: We have discussed university limits; would you want to elaborate more? They mention, for example, animal research efforts in Canadian universities are proportionately smaller than in the United States.

Mr. Williams: I think that I would ask Dr. Woodward or Dr. Migicovsky to elaborate on this.

Dr. Migicovsky: That is true, but the big reason is the costliness of large animal research. Large animal research is the most costly item of any research we do in agriculture; there is the reason.

The contributions made to university research have been of such a nature that it is difficult for any one university to launch a large program in animal research.

Senator Thompson: As far as research on wheat, and I am sorry I cannot find the actual quote on this, but again a comparison was made suggesting that wheat is a major staple for export as well as internally for Canada and yet that in comparison with the United States in proportion to acreage that the United States, I think, has one scientist, I may be incorrect in this, for a million acres, and we have a great deal less number of scientists.

The Economic Council is suggesting that in view of the importance of wheat to us that

we should be giving a greater proportion of our scientific research to that. We spend more on soya beans; you will have to excuse my ignorance but, as I understand it, these other products than on wheat. Would you comment on that?

Dr. Migicovsky: The amount of research that should be put on any one product is not very well calculated if you simply do ordinary arithmetic and you say the gross national product is such, or the productivity is so great, therefore relatively we should have that many officers.

To comment on the comparison between the United States and Canada: They may have found that they have more problems with respect to their research also since they have 51 states and their research is more or less divided into that many units, the amount of research in any one unit could be greater.

Perhaps I could say facetiously that we do not need as many because we have better research; that may well be the case, but our research is devoted to the problems in our agriculture and we allocate according to where the problems are and how much that particular problem requires in terms of research.

In our judgment with respect to the amount of money available to us we have had to allocate it in the manner we have. Perhaps if we had more it would go into cereals, animals and engineering, and this is what we expect to do.

Our tendency is to put our money where our problems are and I think the success of our cereal industry, if you will, is a reflection of the good research that has been done in Canada with respect to cereals.

Senator Thompson: But to come back to this figure, that we were twentieth in wheat yields per acre after the war of the major nations of the world and today Canada is twenty-eighth; it was suggested that this is not because we are losing in the amount of our production, but that others are gaining on us.

I would assume they are gaining because, as I say, of improved techniques, increased mechanization, and a number of other factors.

Is this not very important to us, that we should be maintaining our position, at least at twenty-eighth?

Dr. Migicovsky: The position is a relative one; now where other countries have come into production and increased their production in part due to the fact that some of these new varieties that have come into existence are grown in areas that are not nearly as severe as those presented by Canada.

In other words, research to increase productivity in Canada as compared to research to increase productivity in the central United States, if you were to compare that, the amount of research required in Canada would be that much greater. It is like taking two airplanes, one flying with a headwind and one flying with a tailwind.

Because the conditions that face us in Canada are of such a nature that it is much more difficult to make progress than it is when you compare the conditions that face the people of the United States in the central states, the growing season and so on.

Senator Thompson: Let me take another aspect: If Canada has moved from twentieth to twenty-eighth, and the reason is that other countries are starting to increase their technical abilities to grow wheat and they have got better climatic conditions and so on, are you doing a study to indicate that we should be moving into other areas of crop production than wheat?

Dr. Migicovsky: These are always under study; opportunities for diversification are being looked into; the use of other, different varieties of our cereals are being looked into.

These are all being looked at and, of course, the entrance of the economists I think in greater number will do a great deal towards helping to solve these particular problems.

Mr. Williams: I think I should, sir, go back here at this point to a statement I made previously about different types of wheat and different qualities of wheat.

I think this is one point that bears on the question in hand: In reply to your last question I suppose that the biggest area that is taking our concern at the moment is that as to whether or not the very high quality, relatively low yield wheats in Canada are the kinds that we should continue to produce. There are several major studies under way at this present time, not only within this department, but also among other agencies.

You may recall, sir, that the Minister of Agriculture announced a short time ago the formation of a National Grains Council. This is going to be one of its first jobs, as to whether or not we should, with the changing world markets, perhaps give some consideration to de-emphasizing quality and placing more emphasis in our selection program on over-all yields.

A further point that I think has altered the relative position of Canada is that in many countries of the world that were not traditionally wheat producers they have moved to a system of subsidized wheat production that has in essence brought better lands in that country into production than was previously the case.

I think probably one of the areas where this is most true is in eastern Europe, western Europe at least, and in the United Kingdom, where a program of subsidization of wheat production in order that they might meet some of their internal aims in respect of self sufficiency, or approaching self sufficiency, has resulted in a transfer of lands that formerly were used for higher priced crops to wheat crops.

There are countries in this world where wheat is subsidized, for example, at the level of almost twice the level that the Canadian farmer gets for it. Obviously these people devote better resources, or are able to devote better resources to it, thus their yields tend to go up.

Senator Grosart: Mr. Chairman, I am sorry I was not here this morning but I was attending another committee, as you know; all I can say is stop me if you have heard this one.

The first is a specific that I was asked to put to the witnesses; it refers to a development, I believe, in the department of an antibiotic called myxin. The information I have is that it was hailed as a tremendous discovery in the antibiotic field; it was tested and found not to live up to expectations and was perhaps patented by Canadian Patents Limited.

Could you tell us anything about that?

Dr. Migicovsky: Yes, myxin was discovered by the Cell Biology Research Institute here in Ottawa. It appeared to have on the basis of laboratory tests and some very preliminary small animal tests efficacy as a very valuable

antibiotic. It was patented and the patent was licensed to one of the drug firms in Canada.

It was subsequently found that it could not be used as a potent antibiotic, for several reasons. One was its insolubility; two, its toxicity; and also its efficacy was questioned with respect to large animal infections.

It is thought now that it could possibly be of use as an antibiotic in terms of some of the plant diseases. This is now being investigated.

Like many other discoveries which appear in the headlines, and you know that we have cancer cures about every other week, I regret to say this is probably one of them. Why it did not work out and why subsequent tests did not show up, these are one of the risks we take in terms of research.

In other words, if you throw darts at the board and the tenth one hits the bull's eye, we might well ask why did you bother with the first nine.

Senator Grosart: It was not meant as a critical question; it was just meant to ask for information.

You still have some interest in this, and some hopes that it may prove useful?

Dr. Migicovsky: That is correct. It is still under investigation and I might say that the National Research Council came in in co-operation with this work; they did the chemical synthesis work. They have synthesized a number of other derivatives which may hold promise; I cannot say. Investigations are under way.

Senator Grosart: Yes; I notice that in your brief you show very little interest in patenting developments of your research efforts in the department and you give a very good reason, but you speak of one very interesting patent. This is on page 94; I will not read it, but I would be very interested in hearing some further comment on the monopoly breakthrough aspect of it.

This is the dehydrated potato flakes field. What was the nature of the monopoly that you broke through?

Dr. Migicovsky: They had a monopoly on this process; this is the potato one we are thinking of, is it?

Senator Grosart: Yes?

Dr. Migicovsky: They had a process by which they had a monopoly on producing this kind of product. As a result of this discovery which gave us an alternative method we were

able to patent it, therefore it broke the monopoly of the former method.

This is very frequently done in terms of patents, as you well know.

Mr. Williams: If I might expand on it a little bit, sir, basically the situation was that there was a patent; it had very limited licensing in Canada and the main source of this particular product, dehydrated potatoes, or instant potatoes as they are called, was from other countries and were so being sold in Canada.

It was fortunate in his case that our people were able to develop a patentable process that produced a product that we felt was superior to the other patent and we made this available to Canadian manufacturers who wished to use Canadian potatoes to produce a Canadian product.

This is the reference here.

Senator Hays: Yes; well, while I see you do not go extensively into the patent field, do you have a substantial number of developments in your research work that you are able to turn over to private industry? Is this a common experience?

Dr. Migicovsky: Not really, not very; it is not very extensive.

Senator Hays: Not in the veterinary field?

Dr. Migicovsky: No; there are almost so few that we can almost name them on the fingers of our hand.

Senator Hays: The second part of my question was taking those outside the patent fence.

Mr. Williams: Oh, yes; there are many, many of those; many, many of them.

The Chairman: In what particular field, for instance?

Mr. Williams: If you are talking about the industry as a whole, practices that the farmers are using, or are you speaking of the industrial end of it?

Senator Grosart: I am speaking now of work that you have done that has subsequently become a commercial product.

The Chairman: For the industrial sector?

Senator Hays: Yes; in other words, research that you have passed over into the industrial sector?

Mr. Williams: For the industrial sector, not the production end of it?

Senator Hays: No, the industrial end of it?

Mr. Williams: Yes; I would say they are quite numerous. We have many in the area of storage; in the areas of transportation; in the areas of food processing.

I could go on I think for quite some time and name various things, many of the products that are presently on the market represent developments that have taken place on our research farms and stations.

Senator Grosart: Do you have an innovation division, or a marketing division within the department?

Mr. Williams: Not specifically, but we do have a food processing institute and we do have at three separate locations across Canada laboratories that are particularly interested in this entire question of food processing to put it particularly.

Senator Grosart: When you come up with a discovery that seems to have some application, some industrial application, what do you do? Do you go beyond the scientific paper, or do you go out and look for firms that might exploit it, or might be interested in distributing it?

Mr. Williams: It depends very much, sir; if we believe that it needs a considerable amount of developmental work and that that developmental work will not be carried on without a patent, our tendency is to go to the Canadian Patents and Developments and seek their view as to whether it should be patented and licensed by them, in that in general in the food industry people are not particularly interested in putting money into development unless they have some exclusive right to the product for some time, or at least partial exclusive right.

On the other hand, if it is an innovation that does not require development we simply put it in the public domain immediately through publications and through contacts that the people in the other side of our department, that is to say the regulatory side of the department, have with the industry.

Senator Grosart: Yes; I was really particularly interested in what machinery you might have, because we have had evidence that in some cases discoveries are made at perhaps the basic research level and then because of

the very high costs of moving that basic research discovery level through applied science and into technology, that people on a pure scientific level tend to forget them.

The question naturally arises, why pure science? How do you bridge this gap?

Mr. Williams: Well, I think that I will have to say, sir, that we have no formal mechanism; we deal with it pretty much on an ad hoc basis.

I can name one example, for example Dr. Migicovsky who is with us discovered a method for removing strontium 90 from milk. Very great consideration was given as to whether or not this should be patented and whether he should go through the developmental processes. The decision was made that in view of the possible benefits that would accrue as compared with the costs we should not do the developmental work. However, it was taken up by the United States and the United States did the developmental work and Dr. Migicovsky worked very closely with them.

So that I would say that we do not have a formal mechanism, sir, and each case is handled on its own merits.

Senator Grosart: You do not feel the need for one?

The Chairman: But does that not result in a kind of isolation in so far as your research activities are concerned?

Perhaps these figures are not very good, but they show, for instance, that in 1965-66 out of a total expenditure of \$28 million for R and D the expenditures of the department for development work were only \$2.7 million, which means that you are not doing very much development work within the department.

On the other hand, private industry is not doing very much and you seem also to infer that the provinces are not doing very much. When you say, for instance, that while the responsibilities in the field of extension of the results of research to ultimate users lie primarily with the provincial authority, most provinces have not or cannot meet their obligation, so if the provinces are not meeting their obligations and if industry does not do very much and if you have no direct contact with industry and if you do very little developmental work, most of your activities are

concentrated on fundamental or applied research, and it more or less ends there. Is that true?

Mr. Williams: I suppose, sir, that I would have to say that in all these matters we probably could do more. I also think though that we have a little bit of a problem here in terms of definition, in that developmental work in terms of agricultural research, we normally do not put anything out as a method that is suitable for use in this country unless we have done this with the primary producer as opposed to the industrial sector, until it has been thoroughly tested at our laboratories or at our experimental farms.

Now, I am not sure as to the breakdown of those figures, so you will have to excuse me for that, but I would think that by the common use of the word development as applied to other types of research that much of our work of this nature would be called developmental work.

In other words, our plant breeder finds a variety; he considers it as part of his research work, the applied research, the testing of it at X stations for Y years across all the areas that he thinks it might be suitable in. I am sure that other people would consider this developmental work, rather than research work and I would suspect, sir, that a great deal of this discrepancy in developmental work as opposed to applied and basic research falls in this area once again of definition.

In so far as industrial processes are concerned, we do not specialize in that area; we orient towards the producer himself. Obviously we do carry through many products into the ultimate utilization, but we do very little developmental work in that area and I would not argue with anybody, sir, who said we probably should do more.

Senator Grosart: I think my questions were prompted by two matters arising out of your brief: one is the emphasis on the scientific papers where this seems to be one of the criteria of promotion and pay; the other is some rough arithmetic which seems to suggest that your scientific manpower may be spread pretty thin through your projects.

The rough arithmetic that I have here indicates—I refer to page 144, Table 2.9.1—that the Research Branch is shown to have 1,417 projects under way, not including testing and adaption trials, for which you have a scien-

tific and professional staff of 920, which looks like a ratio of about one and one-half projects per scientific or professional staff.

This seems to be spreading it pretty thin and if the mission to which they are orienting their work is a scientific paper I wonder what time they have left.

That is why I spoke of a mechanism to get into the applied field.

Mr. Williams: I think I would ask Dr. Migicovsky to answer this, please.

Dr. Migicovsky: We first have to recognize that scientific papers will result from both what has normally been referred to as pure research and applied research. They all give rise to papers. Also what should be called development also gives rise to scientific papers.

So scientific papers are really not the criterion of whether the work is applied—because it produces a scientific paper does not mean that the work is not going to be applied and developed and used by the people for whom it was intended. We have to bear this in mind.

Scientific papers are a very good means by which we get the results of our research distributed to the people who are interested in learning about it; it is the only way we really have, in terms of science, in doing it and therefore it is extremely important.

We do not put all our measurements on pure scientific papers; it is only one of the criteria that we utilize for promotion, and so on, but it is an important one, because that is how the scientist shows us what he has done and this is what he strives to do, put the results of his work on paper.

The Chairman: Is this an answer to your question?

Senator Grosart: A partial answer; one always in this field thinks of Malthus, of course, who wrote his paper a hundred years before anyone paid any attention to it. One wonders how much this happens in this area.

Dr. Migicovsky: Not in our organization; we review our work constantly. At every station and institute there is a director, our section heads, who know about the results of the work of the people working under them.

It also is brought to the attention of the co-ordinators at headquarters and we are

very much aware of all work that is being done and we can follow it to see whether the results are being followed up or applied, as the case may be.

Senator Grosart: In other words, you have perhaps a series of mechanisms?

Dr. Migicovsky: Oh, we certainly do.

Senator Grosart: Or a policy to bridge this gap that I am speaking of?

The Chairman: Would you say that most of your research projects originate initially from your research workers?

Mr. Williams: Yes; in the formal sense they do originate with them and come up, rather than start at the top and are forced down. They originate basically because there are problems in agriculture in parts of this country.

I might say in further explanation of the last question, I think we have another mechanism, sir, that keeps us honest, if you will put quotations around the word honest in this respect, that is our clientele are very close to our research workers. We have advisory committees at most of our major stations who work with our research people; we have our farmers, who are clients into our research stations and unless the work there is pretty well oriented in the direction that they feel it should be going we certainly hear about it very quickly.

The Chairman: But once the initial proposal has been made by the prospective author, then it goes through the process which is described here in your brief.

Could you say what is the proportion of these projects that are approved and rejected by this process of examination?

Dr. Woodward: Mr. Chairman, if I may say there is a very small proportion that has finally come up to the level of authorization that are rejected.

The Chairman: A very small proportion?

Dr. Woodward: A small proportion, because actually the program areas are assigned by the strategy of the executive of the research branch and manpower is recruited to program areas. Then the man who is assigned this problem develops his project on the problem.

When this project comes forward, if it is not satisfactory and does not lead up to the

goals and objectives that we want to achieve, there will be consultation with the director of the establishment and the research officer by our research co-ordinators, such as Dr. Skolko, so that when finally a project comes up to the executive for approval there are a small proportion that are rejected at that time and I think very properly so.

The Chairman: But this is at that stage; it seems to me that priority should be applied and it may very well be, for instance, that the initial proposal was of great interest to the researcher himself and may not have the same interest for Canada as a whole; how do you take care of this?

Dr. Woodward: This is taken care of by our executive group and the consultation within that group and between the co-ordinating group in the research branch where the co-ordinators discuss the relative priorities and weights within the resources we can afford to put on any particular project.

The Chairman: In any event, they are almost all accepted finally?

Dr. Woodward: Only after the co-ordinators have negotiated, sir.

Dr. Migicovsky: It is the program area that gets the priority; the actual individual project has to fit into a program area.

Now, as to how an individual researcher can plan his work, he puts the plan forward and it is the plan of that individual project that comes under examination of the co-ordinators. Now, the program area has been decided by the executive as to whether this is a priority program area. It might be the case of wheat breeding; it might be in the case of food technology, a certain area of food technology for apples; or it might be in the case of a certain area of agricultural engineering which we have been told by CASCC, or some other agency, that this is a high priority area. We have already decided that it is a high priority area.

Now, it is the filling in into that area; we also do it by hiring. Where we have a vacancy we have to make a decision, are we going to hire into agricultural engineering; are we going to hire into cereal breeding; or into fruit breeding, as the case may be. Naturally, this is where the executive has to make a decision: What is the highest priority at this particular time? Where are we going to put our resources?

The Chairman: What do you mean by the executive?

Dr. Migicovsky: The executive is made up of the Director-General and the five Assistant Director-Generals and of course they have available to them the research co-ordinators in the various areas who advise them on particular problems.

Senator Grosart: Do you have any kind of on-going technological audit of these projects?

Dr. Migicovsky: Constantly; our research co-ordinator is responsible for one or several areas of research throughout the branch and he is responsible for continually reviewing the work being done in that particular area and he could suggest changes that should be made, perhaps the removal of people, moving from one area to another, or where vacancies occur whether they should or should not be filled, whether the vacancy should be moved into another area. This type of thing, and the individual projects are reported on and continuously vetted by the co-ordinators.

Mr. Williams: There is a formal procedure whereby for every authorized project in the research branch, a report is required on it annually and a review and reassessment of it on at least a five year basis. So that these things must be reassessed by people as a requirement, and our project system forces this on the group.

Senator Grosart: Who examines the audits over the whole department?

Mr. Williams: The executive of the research branch, backed up by the various co-ordinators, one or more of the 12 co-ordinators that have responsibilities for discipline groups.

Senator Grosart: Then is there a total analysis of this at the executive level? Could you look over the whole thing and say there are so many abandoned this year; so many should be abandoned, so many new projects?

Dr. Migicovsky: This is done, but it is not done as simply as that, because you have to realize that we have approximately 1,000 professional people, and there is this number of projects.

Senator Grosart: This would seem to make it more rather than less necessary.

Dr. Migicovsky: I don't say necessary—

Senator Grosart: Your assessment of the auditing, the fact that you have "X" people.

Dr. Migicovsky: There is an assessment done by the co-ordinators and the executive. This is the assessment, and decisions are made as to whether you stop or renew or start another new one, as the case may be.

Senator Grosart: In this problem-oriented area, where you take on projects which are specifically related to a problem you have discovered or have had reported to you, do you make a crude count, say, that "this year we solved so many, and we found so many insoluble"? Do you make that kind of crude count, which you can do in business, because your accountability is different, I would think. I am an old PR man and if I were your PR man I would want to put it out for the public that we solved X number of problems this year for the farmers."

Mr. Williams: I suppose we go through that each year, when we present a report to the Minister of Agriculture in which we are allowed to highlight only the accomplishments of each branch each year and at that time there is a very definite assessment of what have been the major areas of progress, but it is not quite the type of assessment that you are speaking of.

Dr. Migicovsky: We do not make that kind of assessment. Each station and institute and farm puts out an annual report and you get a look at that and see exactly what they have done and accomplished. In addition to that, we have now embarked on the "management by objectives" scheme and we are re-aligning all our projects in terms of objectives and goals and activities. This will make it easier for us to be more efficient, in enabling us to assess for each project what has been done in this type of thing. This will make it easier. We go through this but not in as formal a manner as perhaps if you were in business and making a single product—how many products have you made and how much profit from each product, and so on. It does not quite fit into that, because not all our benefits are monetary.

Senator Grosart: I am not suggesting that. You mentioned the annual report. I am not greatly impressed with the annual reports of any department or of any business, and most of us look to the notes to the financial statement to get the real facts about the finances.

In your annual report do you, if I may say so, boast—and quite properly—about your achievements, but do you not give the misses—that is what I am interested in. Have you made this kind of practical audit?

Mr. Williams: I would say no, sir.

The Chairman: What was the last review you made of your different projects? Do you do that at the end of the calendar year or early in the fiscal year?

Dr. Migicovsky: The research directors will start within a matter of less than a month writing up the annual review, the report for the 1968 calendar year.

The Chairman: For instance, let us refer to the last annual review that was made, would you have any idea of how many projects were stopped at that time?

Dr. Migicovsky: Yes, we would know exactly how many were stopped and how many were started.

The Chairman: Do you have that figure?

Dr. Migicovsky: Right now, I am afraid not.

Dr. Woodward: We do have a continuing review, and projects are continually being stopped and new ones being started throughout the year, and we do make a monthly or quarterly review of all projects being discontinued or initiated.

The Chairman: Suppose you stop a program or project and the staff which was engaged on that project does not have any other project to undertake in that field in terms of your own priorities, what do they do?

Dr. Woodward: In good management practice we expect, when we stop a program, to have a suggested program recommended as a replacement for it. Certainly we have to keep everybody busy, to keep up good morale, and it is not practical to discontinue a man's work unless you assign him something more important.

Senator Grosart: You should tell that to the Treasury Board.

Dr. Migicovsky: The difficulty is not in finding work for them to do but in selecting the ones we want to be working on, for them to start on. There is no lack of projects to be started. There is no difficulty there at all.

The Chairman: You seem to have a complaint about this on page 2 of your summary, paragraph 11. You seem to complain about the inflexibility in transferring staff to meet changing program requirements. What do you have in mind?

Dr. Migicovsky: Let me explain this to you, as an example. Perhaps we feel that we want to start a project some place in Summerland, for example, because of a problem that has arisen there and has been brought to our attention; and we have to have three entomologists and two chemists to do it. But we don't have any new positions. Therefore, we have to wait for vacancies that have occurred elsewhere, and then we have to find and hire new people to put into those vacancies to go to Summerland. Or we can find people who are now working on other projects, entomologists and chemists, and transfer them from, say, Kemptville or Ottawa to Summerland.

All this creates a problem. We cannot hire people for new positions because we do not have that much turnover. The only flexibility we have is the amount of turnover we have—the number of positions that become vacant due to attrition, retirements and so on. This is why we do not have the flexibility.

The Chairman: At some stage in the report, although I do not have the exact reference here, you seem to imply that there is a problem of personnel that may have a political aspect to it.

Dr. Migicovsky: Perhaps you are referring to the closing out of the stations.

Mr. Williams: The discontinuing of work in certain areas?

The Chairman: At any rate, it would be related to this problem of flexibility. Do you mean that perhaps you would like to get rid of some people but cannot because of the axiom that when you are in the public service you cannot be fired?

Dr. Migicovsky: I am not criticizing that attitude, but it is part of the problem. Obviously, an organization the size of ours would always have a small percentage of people who are not quite up to snuff. Certainly we would increase the efficiency of our organization were we to replace older people with young, bright effective scientists. A man may have been with us for 25 years, and may have been very effective 15 or 25 years ago,—but

by virtue of the changes that have occurred in science it is very difficult for many people to keep up. This takes place not only in science but in every other walk of life, including medicine and law.

Senator Grosart: And politics.

Dr. Migicovsky: Do you fire this man after 25 years? You do not. You have the problem of inflexibility and you deal with it as best you can. I think we do so reasonably effectively. We get into a lot of problems that do not require a high degree of ability and are still within the ken of an individual, and we try to suit the problem to the man as best we can.

The Chairman: We had Dr. Uffen from the Defence Research Board before us. He told us that, in his field at least, a good number of researchers beyond the age of 40 were more or less obsolete for the purpose of research work.

Senator Grosart: In terms of creativity.

The Chairman: Yes, and in terms of new research developments in their respective disciplines. Do you find this to be so in your area of work?

Dr. Migicovsky: Not to the same degree as they do in the physical sciences. Many of our people in the applied fields have remained efficient to the day of their retirement, and I could name them off. On the other hand, there are some people who lose their effectiveness by virtue of the fact that their science has gone beyond them.

Mr. Williams: I might suggest, too, sir, that there is probably another place where our situation is different from Dr. Uffen's, in that some of these people, while they may lose some of their zip—and I think this was a reference to research officers—we have 37 field establishments, and we have many management and operational jobs needed to run some of these very large establishments, and some of these people fit in very well at super-administrative-type jobs. I don't mean just research management, but research administration, and within a number of these field operations we have found these people doing excellent jobs for us in some of these areas.

Senator Grosart: Mr. Chairman, a final question on personnel; we seem to have started a debate between the Science Council and the National Research Council as to whether

or not we are going to have a surplus of Ph.D.'s. I was rather surprised to see in your table on page 70, which refers to post-doctoral fellows, that only eight of a total of 125 are Canadian. Does this constitute a problem?

Dr. Woodward: It is a problem of a supply of Canadians, and the reason that we have not had many Canadians as post-doctoral fellows is that we have had vacancies which we could offer to Canadian Ph.D.'s. Financially a man finds coming in on full salary in a permanent position on a probational basis more attractive than the stipend for the post-doctoral fellows.

Senator Grosart: It seems to be attractive to a large number of people from other countries. I see there are 31 Indians, 28 Japanese, 12 British, nine Czechs, and then we have Canada with eight.

Dr. Woodward: This is explained to some extent by the difference in the economies of the countries and there is also the fact that if we have a good Canadian boy he has priority for permanent appointment.

Senator Grosart: But it seems that these other people are interested in getting their feet wet as post-doctoral fellows.

Senator Belisle: I believe it has been said a while ago that we had a thousand professionals scattered all over the place. How many of those or what percentage would be Ph.D.'s?

Dr. Migicovsky: According to the breakdown there would be approximately 400-and-some-odd Ph.D.'s.

Mr. Williams: Five hundred and fifty-one out of a total of 1,208.

Dr. Migicovsky: But there are 600 others that have Ph.D. equivalent.

Senator Thompson: We are very lucky to have people of other nationalities who want to come here with their skills. Do you have the feeling that you regret that you are not able to have the lower institutions and graduate schools and universities in Canada to produce people for you and because there are not enough coming through you have to take people from other countries?

The Chairman: It would seem that we are not rendering a very great service to India.

Mr. Williams: Why is that?

The Chairman: Well, we are hiring all these Ph.D.'s from India when probably she has need of their services herself.

Mr. Williams: In that respect we should remember that these people are over here as post-doctorate fellows for a definite term and for their own educational enlargement. In fact many have come under our own External Aid and other programs. In that particular table it will be noticed that these people are not here as employees but are here as an extension of their own education. They are fellows. Some of them may eventually cease being fellows and become employees, but on the table shown there they are not members of the department. This is an educational program being conducted by the department for the mutual benefit of students and the department.

Senator Thompson: I would like to talk about external aid at some point, but I do not want to intrude on the others who are following up in this area.

The Chairman: I still have a few questions on personnel. I think we might stay on this for a while. Do you have any questions, Senator Belisle, on that?

Senator Belisle: I had one on patents. On page 118 you said that a machine was developed regarding root maggots.

A machine was developed for applying insecticide and crucifer seeds at precise levels in the soil and commercial models of the machine are now in use in the Maritime Provinces and Northeastern U.S.

Is this protected by patents?

Dr. Woodward: No, sir.

Senator Belisle: Where are the commercial models manufactured?

Mr. Williams: These particular ones?

Senator Belisle: Yes.

Mr. Williams: I am afraid I cannot answer that. Do you know, Dr. Woodward?

Dr. Woodward: No, I do not know.

Mr. Williams: They will be manufactured by some farm machinery manufacturer. We can get that information for you.

Dr. Skolko: The demands would be in such low numbers that it probably would not be on a commercial scale.

Senator Belisle: Was market research carried out to assist in assessing the export potential? And what is the dollar total of its production; and the role of other departments in the same field?

Mr. Williams: We will have to obtain that information for you. We do not have it here.

Senator Grosart: Are you making enough money available in grants to universities—which total, I think, about three-quarters of a million dollars?

Mr. Woodward: \$800,000.

Mr. Williams: Just over three-quarters of a million dollars.

Senator Grosart: Is this sufficient to attract scientists into this field? You seem to be having a problem. You say at page 49:

Factors other than supply shortage also affect our ability to attract high quality scientists. Insufficient financial reward and prospects of advancement are discouraging to scientists in government employ. Complex and restrictive administrative regulations in government procedures detract from the freedom and prestige that scientists expect and receive in the university environment.

It is really so that the university environment is more attractive to scientifically-minded people than mission-oriented projects?

Dr. Skolko: If you look at the number of people who have left CDA to go to Canadian universities, there must be some attractions, and I suspect it is not only a salary consideration.

Senator Grosart: It would seem that on these projects you could give them all the freedom they wanted. I do not understand where there is lack of freedom or initiative or incentive for a creative scientist in the kind of mission-oriented projects you have and particularly the problem-oriented ones.

Dr. Woodward: Mr. Chairman, I think we have gone through periods when, for example, conditions in universities were better than the conditions in Government, and vice versa. Until we got our research scientist class and our maturity curve adjusted as of April 1, 1968, we really were not presenting the salary and career opportunities to our officers that they were receiving in the universities.

I think one other thing has contributed, and that is that the growth of our financial resources has hardly kept pace with the decreasing purchasing power of the dollar.

Senator Grosart: We all have that problem.

Dr. Woodward: And our officers in some places have had their salaries paid, but with respect to non-salary operating moneys they have had more attractive offers from universities, where they get better financial support for the work they want to do.

I am not talking about just equipment and buildings; I am talking about supporting people. We may have a distinguished scientist and provide him, for example, with one technician. That is all the support he may have. But, he knows that if he goes to a university he can attract three, four or five graduate students, and that he will have not only those three, four, or five youngsters pushing him—and, you know, they are at the age when they are really striving—but that he will have many more strings to his bow. So, I would say that the fact that a young man knows that he can go to the universities where he can persuade graduate students to work for him is a great attraction.

Senator Grosart: I am very well aware of the general recommendation of the Science Council that there should be less public money put into in-house government R&D than is now the case. The general recommendation seems to be that we are in an imbalance in favour of in-house R&D as against R&D in the universities and industry. I am not altogether convinced of that because, as my questioning has probably indicated, I am strongly of the opinion that the place to do research is somewhere as close as possible to the practical problem. I am not convinced that contracting out to a university is going to get you a one hundred per cent concentration on the mission. Would anybody care to comment on that?

Mr. Williams: Perhaps Dr. Migicovsky would comment on it.

Dr. Migicovsky: I think we have to look at it in several ways. A comparison between university and in-house government research has to be very carefully made. Many of the comparisons are invalid—

Senator Grosart: I am glad to hear you say that.

Dr. Migicovsky: —because the university also has its responsibility to further education, and some people are more attracted to university life by, let us say, the status that a professorship gives them, or that living on campus gives them. They are more attracted to this than they are to working in the pragmatic atmosphere of a research station or institute, as the case may be. I do not agree with the Science Council that in-house research has to be reduced.

Senator Grosart: Good.

Dr. Migicovsky: But, I do agree that we have to increase the activities at universities so that they will produce the type of people that in-house research requires. I do not know where they are going to get the necessary help in this except from government, but that does not say that you should decrease the amount of in-house research, because the problems we have to face in Canada are still there and will have to be solved by a combined effort of the kind of in-house research we do and the kind of research done by the universities.

The universities are not as well fitted to do the kind of research we do in-house, although we are hearing today a great deal of the research that is done at universities. In my opinion, there has to be this complementary activity.

The Chairman: Why did they move, then?

Dr. Migicovsky: You have to do it on an individual basis, and each man has his own reasons. He may for the moment be dissatisfied with the kind of progress he is making in his research. His reputation may not be growing to the extent that he would like to see it grow. He might not like living in Lethbridge or Swift Current, as the case may be, and when the opportunity arrives for him to move to Saskatoon or to London, or wherever the university is, his wife says: "This is much better. You will be known as a professor and you will live a better life." This may be one of several reasons. I would say that the number of people who have moved from Agriculture to the universities would have any one of a hundred different reasons for so doing. I do not think you can generalize.

The Chairman: I notice, for instance, that at my former university, Laval, a lot of people have left the department to move to the Faculty of Agriculture; about 10 or 12 I think.

Mr. Williams: That is correct, sir. I know there is a special situation. The Faculty of Agriculture had just been created and we were the only concern in Canada to supply the staff for the faculty.

Dr. Migicovsky: The research branch has often felt that one of its responsibilities to Canada is to provide excellent personnel for universities so that they can meet the standards we require from them.

The Chairman: That was the main reason in this case.

Mr. Williams: It was a very special case at Laval, where they created a faculty and had to start it overnight, so to speak. When I say "overnight", I mean that we certainly worked out a program with them for staffing it.

Senator Grosart: Maybe you should start having your own titles and degrees!

Senator Belisle: Like O.E.C.

Mr. Williams: This is a very valid problem that you have raised. It concerns us very much. I suppose one of the major problems that we face in the research branch is having research out close to the problem on the basis of being able to keep the research worker close to the problem. Certainly the people we have to send on the Alaska Highway do not care to settle there for very long, or on some of our other outposts. It is a constant problem and we have to resolve the conflict between having the workers at the problem and insuring that we have excellent people doing the work and that they are happy and satisfied.

Senator Belisle: My question has been partly answered but I must disagree with the doctor, for one reason. I agree with the Science Council, I happen to be chairman of the board of a university and I would like to see more money in the universities.

The Chairman: You are prejudiced!

Senator Belisle: If you had more money available would you spend more because you are getting good co-operation from the universities, or would you do it at home?

Dr. Migicovsky: I do not disagree with you. I agree that there should be more money in the universities. I do not think you should give money to the universities at the expense of the existing in-house research.

Senator Belisle: But would there not be a tendency for duplication?

Dr. Migicovsky: No, there will be no tendency towards that at all. There is so much to be done and so few people to do it. We do not have to worry about duplication for anyway the next 50 years. The branch attempts to work as much as possible with universities. We encourage our people to take part in the university activity. Where we have stations near universities relations are excellent; our people are doing some teaching and there is a great deal of co-operative effort. It may not be formal but it goes on. Our policy is to increase and improve our relations with universities on research, and even to do some teaching. Laval is a good case in point, where they are starting from scratch.

Mr. Williams: In further reply to the direct question, I would refer you to the table on page 86. It shows our grants from extra-mural research have increased from just \$20,000 some years ago to \$145,000 and on page 89 the funds allocated for our operating grants to the universities in the short time we have had those funds have doubled and this year, in the year to come at least, I believe our item is over \$800,000, so they are pretty well tripled in four years. We have increased definitely.

Senator Grosart: I meant to ask you a question. What is the reason for the discrepancy over the years between the number of applications received and the funds requested? Are these applications from individuals or from universities?

Dr. Woodward: They are from individuals, sir.

Senator Grosart: Individuals requesting scholarships, bursaries and for specific research?

Mr. Williams: A grant for specific research proposals. This is not scholarships in the accepted sense of the word. This is a grant to do a specific piece of work.

Senator Grosart: For example in 1968-69 you were able to respond favourably to not much more than a third; is that right?

Dr. Woodward: That is right.

Senator Grosart: What happens to the other projects?

Mr. Williams: Better than half, sir. I meant the number of applications. We had 229 applications and we supported 424 projects.

Senator Grosart: I was thinking in terms of dollars. What happens to the other people you turn down and the other projects?

Mr. Migicovsky: The national Research Council admit they feel they support agricultural research to the tune of approximately \$2 million. It is how they break that down. It could be argued as to whether it is agricultural or whether it is biology. Let us assume this figure is correct. This is the figure they use. This money goes to the people who apply for that part of the \$2 million.

The Chairman: We really have there two more or less competing for complementary programs.

Mr. Williams: We have people sitting on the NRC.

Mr. Migicovsky: Sitting also on the Agricultural Committee.

The Chairman: Would they normally go to your department first rather than NRC?

Mr. Migicovsky: Not necessarily. Some go to the NRC first and come to us both for different parts of projects, the same person. It is complementary.

Mr. Williams: I think I should make it clear in general, one of the major criteria we use in making these operating grants is that the work there is to be directly related to some work we are doing or should supplement or complement that work or else the worker is in a field where we feel that we need additional workers.

Senator Grosart: I understand that something like 70 per cent of your Ph.D.'s are educated outside of Canada. Do you have a problem of a lack of Canadian experience here? Does it matter where a man takes his Ph.D. if he is going to work in agriculture in Canada?

Mr. Migicovsky: It is not very serious.

Mr. Williams: I am speaking, not as an ex-member of the research branch, but as Deputy Minister at the moment. I think it is a problem that is growing, not so much where he got his Ph.D., but each succeeding year our people seem to be a little further from the farm and it is a question of understanding farm problems. For example, I think we have a problem where we have the hire people who come from countries where their agriculture is very different from ours. I think there

is a lack of empathy, a lack of understanding and a lack of communication sometimes with that fellow and our farm and our farmers' problem. I think it is a bit of a growing problem, the question of motivating, shall I say, Canadian farm boys to go to higher education in the area of agricultural research.

Senator Grosart: What attracts these foreign Ph.D.'s to Canada?

Mr. Williams: Educational opportunities, I would say, is probably the biggest thing.

Dr. Migicovsky: Career opportunities.

Mr. Williams: Yes, career opportunities. I am sorry—I said educational opportunities.

The Chairman: You acquire foreigners, let us say, and you feed the universities.

Senator Grosart: You are running a sort of pre-post-graduate school.

Dr. Migicovsky: In some respects, yes. What we would like to see is more Ph.D.'s turned out by Canadian universities who will come to us. I think this is happening now, with the very recent growth of faculties of agriculture throughout Canada. They are turning out more Ph.D.'s and therefore we will be able to get our share, I sincerely hope. Also, the departments of biology in various universities are turning out people who are beginning to turn to mission oriented organizations, because this has come into vogue very recently. A number of years ago a man who worked in very erudite pure research was a man who was at the top of the totem pole. Today, society is looking at it differently and the man thinking in terms of applying research and looking at it from that point of view is rising on his totem pole. The general feeling throughout the country is changing in this regard, so we will benefit from it.

Senator Belisle: Is there a difference throughout the country, according to the civil service scale, is there a difference between Ph.D.'s working for you and Ph.D.'s working for the Department of Education or Agriculture.

Mr. Williams: This is a see-saw. Our salaries go up and we find they are followed by a change in professorial salaries at universities.

Senator Belisle: My question is, is there a difference in the Government...

Mr. Williams: Not in the federal Government, but between the Department of Education and the federal Government, because the departments of education are provincial.

Senator Belisle: That was my question—within the federal Government it is all the same?

Mr. Williams: You could always get arguments as to whether or not in some departments the salaries are as high as ours. The same salaries apply across the country in respect of agricultural research officers, but we are almost the sole employers.

Senator Grosart: But this would not mean that every Ph.D. gets the same salary.

Mr. Williams: No, quite the opposite.

Senator Grosart: That is it.

The Chairman: Studies have been made in the United States tending to show that in general and this is a general proposition, the Ph.D. people tend to be perhaps less interested in the innovation process than in the M.A. or those who have the Bachelor degree. Do you find this in your field? Do they tend to be more attracted by pure science or fundamental science and to be rather disinterested about...

Mr. Williams: I think you are asking a matter of opinion and my opinion would be "no" but I would like other people to answer the question also.

Dr. Woodward: My opinion would be "no" because we associate our people in our mission-oriented program with the problems and I am sure that they are as much interested in innovations and in getting their findings into use in Ph.D.'s as in Bachelor's or Master's degree. On the average, the Ph.D.'s work from a broader base and on the average their contributions exceed those of the others.

The Chairman: From a broader base or from a more specialized base?

Dr. Woodward: They have more tools in the bag.

Senator Grosart: There was an MIT study recently which seemed to show that Ph.D.'s were not too effective in technological innovation...

The Chairman: Or not too interested.

Senator Grosart: ...compared to the B.Sc. and M.Sc. That is a broad generality.

Dr. Woodward: For example, at our Summerland research station we have developed approximately 90 new products that have gone into use in the fruit industry in the Okanagan Valley, and these products have come from a team of Ph.D.'s, bachelors and technicians. Certainly, they have been under the leadership of Ph.D.'s.

Dr. Migicovsky: Generalizations are very dangerous.

Senator Grosart: I agree, but it comes back to the point I was making earlier about the bridge between the discovery and solution of a problem and its move into some kind of technological effectiveness.

Dr. Woodward: I might give one example, sir. Dr. Keith Downey of Saskatoon received from the Public Service Commission the highest level of merit award of anyone in our department.

Mr. Williams: It is the highest that has been given: \$2,500.

Dr. Woodward: He developed much of the research, and went right through the developmental stage of the development of the rape-seed industry in western Canada.

The Chairman: Dr. Woodward, do you think that your research operation as such could be better organized, more flexible, and more efficient than it is, if it were to operate outside the authority of the Public Service Commission?

Dr. Woodward: I think it would be extremely difficult, sir, to conduct a mission-oriented program outside the ægis of the department which is responsible for the agricultural policy and programs.

The Chairman: Take the Defence Research Board. They are mission-oriented too and they are directly related to the Department of National Defence. But they have a different status, and with that different status they have more flexibility for purposes of recruitment and other things. I see here, for instance, and again on page 2 where you list your grievances, that the demands of informational services and other investigations pre-empt more important research programs. As you are just a branch in a department, I am sure that the deputy minister can call you on the phone and say "Give up this important research; it is long-term; I have a big problem for today."

Mr. Williams: You attribute to me, sir, that which I do not possess.

The Chairman: I thought deputy ministers were all-powerful.

Dr. Woodward: We have to consider here that the federal Government needs a source of expertise. The Department of Agriculture does. I do not think you can maintain experts unless you have some involvement in research. For example, it is our research people who know where the frontiers of knowledge are; they know what is going on around the world. Unless you have some research yourself you cannot transplant advances in other parts of the world into your own country so that—and I know this is not answering your question about the Public Service Commission—but if you had asked me this question a few years ago I would have probably said "Yes". We would have more flexibility because we would be able, perhaps, to make better use of the merit system in promotion and in employment of people and also that it would be easier to keep salaries modern and relevant to the economy. But we have now our interdepartmental research scientist class. I think we now have an excellent class under the Public Service Commission and we have the tools to keep the salary scales modern and we will have more tools when collective bargaining comes in. Also this class is based strictly on the merit system so that as far as our research scientists themselves go I think we will be able to accommodate them very well under the Public Service Commission.

Mr. Williams: If I might add a word there which, while it is not relevant, is partially relevant—I would think it would be extremely difficult to operate the Department of Agriculture without supporting research and direct involvement of supporting research people. I realize co-operative plans can be developed in some areas. Perhaps I can best illustrate this by something that is going to happen as of the 1st of January. We have been responsible in the Department of Agriculture for the grading of agricultural products. In the hog industry we are starting to face problems based on the grading system we used for evaluating hog carcasses. Competition was increasing from the United States. We were having some trouble with our markets, and it was felt we should have a complete review and reappraisal of our hog grading system. Our people who have the regula-

tory responsibility, which is the other side of the department, worked very closely with the Research Branch, and the Research Branch devoted resources to it, and they undertook very basic research work—"basic," in the dictionary sense of the word—to investigate the relationship between various external characteristics of hog carcasses and the overall quality of the hog carcasses in terms of consumer acceptability and desirability in terms of the market.

As a result of this research, that has been published and so forth, we have now developed a completely new approach to hog grading, probably the most advanced in the world, which will go into effect on the 1st January, and I think we would have had great difficulty doing it had not the control of the research agency and the regulatory agency been under one body, so they could be put to work together with great facility and rapidity.

The Chairman: They do not seem to have any problems in the Department of National Defence from that point of view.

Mr. Williams: I cannot speak about that, because I do not know their problems.

The Chairman: How are you going to solve the grievance you have outlined in the brief, the demands of the informational services tending to override your research activities?

Dr. Woodward: I think this is perhaps related to the priority a research worker puts on his time as compared to the priority the department puts on his expertise. This is a debatable question, and it would vary from case to case, but you must have a source of expertise in the department, and the greater the expertise the more a man is going to be consulted. This is perhaps unfortunate from the research standpoint, but it is a fact of life that the only person not consulted is the person who has not anything to give out.

The Chairman: So it is not really a grievance which is expressed here.

Dr. Woodward: This affects the productivity of our research scientist as compared to that of a research scientist who is quite free from any departmental responsibilities. I think that is what Dr. Skolko's committee was getting at.

Dr. Skolko: I think the disadvantage of having this extension of responsibility would be automatically taken care of if the provincial department, which has primary responsibility, were to assume its responsibility, freeing our people for research; and this is one of the recommendations contained in the report. At the present time we are performing, in effect, a double function; and research, being our primary function, is interfered with.

The Chairman: It is not with the other arm of the department you have problems?

Dr. Skolko: No. This may apply in certain areas where, for example, the economist is continually under stress from the department to gather information, which detracts from the time available to him for his research function.

Dr. Purnell: This problem is relevant to the Economics Branch, which has dual functions. One is to assist in the policy advisory area; and the other, to carry out research to provide a sound information base from which this service can be carried out, and also to carry out inter-disciplinary research work, as was discussed previously today. But when you have demands for service and advisory assistance on urgent problems of the day, the research, which is on-going, can generally be set aside and tends to suffer.

The Chairman: I suppose this is more true of the Economics Branch than the Research Branch?

Mr. Williams: Much more true, I would say, sir, but I was going to say that it sounds as though everything I am saying means that we have a solution just over the hill somewhere. I do not think that is quite correct, but our approach at the present time is, that our Dr. Purnell, who has recently come to the department, is reorganizing our Economics Branch, and is trying to assign certain people who have certain skills to a research section where they will be immune from the day-to-day demands of the department. Whether that is possible depends upon the demands made by the Government, and it remains to be seen, but I hope that that will solve in part the problem that Dr. Purnell has enunciated. It is a real problem. It is a real problem to have to say to the Government: "Well, that fellow is working on a research problem, and we cannot tell you what you should be doing about wheat policy or wheat statistics now."

The tendency is to solve the immediate problem, and leave the longer term problems for solution at a later date. However, we do hope to meet it in that way.

Dr. Purnell: The idea is that we should insulate, rather than isolate, the research people from our service work, because research and service are interrelated.

The Chairman: How many people do you have in the Economic Research Branch?

Dr. Purnell: We have 126 individuals, but 75 of those are professional agricultural economists.

Mr. Williams: That is both research and service. We do not have an economics research branch *per se*. It is in the overall service.

Dr. Purnell: This includes headquarters and field officers as well.

Dr. Woodward: I think that this is an indication of the great demand for agricultural expertise, and the problem is one that all bodies are faced with, that of equating the important against the urgent.

The Chairman: Probably there are more people there than there are in the Department of Finance preparing the budget.

Senator Grosart: The question is which is more important—the Government or the farmer.

The Chairman: Senator Thompson?

Senator Thompson: I was given some material by our secretariat, of which I read some over the weekend. I read the report of the President's Science Advisory Committee entitled "The World Food Problem", at the end of which is a quotation that I should like to read:

...and he gave it for his opinion, that whoever could make two ears of corn, or two blades of grass, to grow upon a spot of ground where only one grew before, would deserve better of mankind, and do more essential service to his country, than the whole race of politicians put together.

That is taken from *Gulliver's Travels* by Jonathan Swift.

I do not want to elaborate on the statistics concerning the world's food problems because I am sure you are well acquainted with them,

but as I understand it we have pretty nearly exhausted the supply of open farmland, and there is the terrible threat of a rising population—the Malthus theory that was mentioned before—and as a layman I thought that this very complex problem could be answered by looking at the matter of distribution. I read with interest about the work being done on fish flour, various oils, and so on, in order to increase the food supply. I realize that it is a very long term proposition, and one that requires almost personal incentives to individual farmers in these countries. You have to encompass a great variety of social, cultural, economic and political implications in order to get anywhere. Yet, obviously, this is something we have got to do immediately, and something we have to work at, because we are behind on the whole situation.

Then, I read your report. I appreciate that we are trying to answer questions we are interested in, but in your report I saw that you had representatives in various countries, and then I saw it mentioned that you are thinking of sending a team of specialists, rather than individuals, over to the underdeveloped countries. I notice in *The World Food Problem* it says that a tour of one and a half to two years by specialists left a permanent mark of culture that has been evolving. I wonder if you could tell us what we are doing in research in this area. There are such subjects as temperate and tropical technology. It says that Canada, in giving surplus wheat, is really endangering, crippling or weakening the farmers of these underdeveloped countries from moving on themselves. What is being done in this area?

Mr. Williams: I think it would take more time that we have available to outline in any detail our total effort here. We have a major effort in this field in the Department of Agriculture through the Bureau of Developmental Aid, which was formerly the External Aid Office. We are doing two things. First, we have a continuing program of endeavouring to train people from these countries within our own organization. Secondly, we have a program under which we send people to these countries.

In general, we do not send people to these countries to instruct the producers. We send them for one of two reasons. We send teams who set about solving technical problems, which may be the development of a disease-resistant variety suited to the area. We might

send a technical team to assist in developing in a program for the better storage and preservation of their resources. The teams and people we have sent out cover the whole gamut.

In general, I think we must agree with the statement to which you just referred—other than the reflection on politicians, sir!—that to send people, or a team of specialists, to talk to the farmers and try to persuade them to change their ways is pretty well a useless procedure. We try to emphasize the basic approach of sending people to help improve their problem-solving capabilities. I do not know whether you would like me to expand on that. Those are the two approaches. This is outside our food aid program, which is oriented towards supplying what the country does want.

One of our major projects is through the World Food Program, and it is basically project oriented; the food is used as an ingredient of a project; that is to say, the food goes to people who are building a road or a school, or it may go for resale to provide funds. We indicate to the World Food Program what type of food and in what quantities we might be prepared to supply, and they in essence draw against this sort of cupboard or food basket that we provide. We do not send our food indiscriminately. It is based on the needs and requests of the country concerned.

Senator Belisle: Also in co-operation with the United Nations Food Fund.

Mr. Williams: With the world food program which is under the food and agricultural branch of the United Nations.

Senator Thompson: I have a lot of questions.

The Chairman: I think, in view of the fact that several members of the committee could not attend today because of the meeting of the Finance Committee, which was especially important today, we will adjourn. If you allow me, sir, our staff will communicate with you again to find another mutually convenient date so that we can meet again. You have spent a lot of time in preparing this material and we would like to go over it as thoroughly as we can ourselves.

Mr. Williams: We are at your call, sir, and will work it out with your staff.

The Chairman: In the meanwhile I want, on behalf of the members of the committee, to express our thanks to you and to all the others and your colleagues who have been so patient with us.

Mr. Williams: Thank you.

Hon. Senators: Hear, hear.

The committee adjourned.

APPENDIX 10

REPORT

to the

SENATE OF CANADA

SPECIAL COMMITTEE ON SCIENCE POLICY

ON THE SCIENTIFIC ACTIVITIES OF THE

CANADA DEPARTMENT OF AGRICULTURE

November, 1968

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SUMMARY

1. Agriculture is the most important primary industry in Canada. It employs over a half million people at the farm level. Farm products are valued at \$4.4 billion. Canada exports almost a third of its agricultural produce or an average of 18% of total exports.
2. A large part of the increased productivity of Canadian agriculture, estimated at 5.5% per year, can be attributed to the substantial public investment in research.
3. In 1966, Canadian agricultural R & D represented 1.9% of Gross Farm Product compared with 1.33% for total R & D of Gross National Product.
4. In Canada, industry participation is estimated at about 10% of the agricultural research effort and the federal share at about 65%. In contrast, in the U.S., industry supports about 54% of the agricultural research while the federal share is about 20%. University and provincial (state) share is about the same in both countries, about one-quarter of the total.
5. In the Canada Department of Agriculture there are five units responsible for scientific activities: Research Branch, Economics Branch, Animal Pathology Division, Grain Research Laboratory, and Library.
6. The Canadian Agricultural Services Coordinating Committee is comprised of representatives from all provincial departments of agriculture, all university agricultural and veterinary medicine faculties, and representatives of the federal department of agriculture, as well as provincial research organizations and other federal departments. CASCC serves as the coordinating body for agricultural research in Canada and reports to the federal Minister of Agriculture.
7. CDA derives its statutory functions and powers with respect to scientific activities from four Acts: The British North America Act; The Department of Agriculture Act (1868); The Experiment Farm Stations Act (1886); The Canada Grain Act (1930).
8. The Department's policy on scientific activities which has evolved under its broad statutory authority may be defined as follows:

To keep its scientific activities 'mission- or problem-oriented' but broadly founded on basic, applied and developmental research.

To carry out the bulk of the program as in-house research, supplemented by extramural contracts.

To direct its research activities to the solution of problems of the primary industry (farm problems).

To cooperate with other federal and provincial agencies and universities in research where the Department has joint interest.

To withdraw our research effort on local problems as appropriate local agencies are able to assume responsibility and increase attention to national and international long-term research.

To provide leadership in the development of a balanced, coordinated program of agricultural science in Canada.

9. CDA maintains research relationships with several federal agencies, including the National Research Council, the Department of Forestry and Rural Development, the Atlantic Development Board, the Department of Trade and Commerce, the Dominion Bureau of Statistics, the Department of Transport, and the Canadian Transport Commission; with industry, universities, and provincial agencies; with the Agricultural Economics Research Council.
10. In addition to a continuing internal review of operational effectiveness, three external investigations have been commissioned: Price Waterhouse and Co. Ltd. (1963-64), Peat, Marwick, Mitchell and Co. (1966), and an Agricultural Task Force (1967).
11. The major hindrances to more effective performance stem from a) lack of a more precise definition of responsibility, b) the demands of informational services and ad hoc investigations which pre-empt more important research programs, c) shortage of trained staff in certain special areas, d) inadequate financial reward for outstanding research performance, e) inadequate laboratory space and equipment, f) inflexibility in staff transfer to meet changing program requirements, and g) budgetary fluctuations which interfere with long range planning.
12. No major organizational changes are forecast, but improvement in interdisciplinary research, methods of program evaluation, consolidation of establishments, and university cooperation, are anticipated. Increased commitments for research in Quebec, for animal research, for farm management research, and for external aid are projected.
13. Recruitment of research staff is effected through the Public Service Commission but personal participation by CDA research staff through university contacts is of major importance.

14. Selection of research administrators is normally made by promotion of research scientists within the department. Remuneration for research administrators and research scientists is approximately equal.
15. Comprehensive intramural training programs are available for managerial and supervisory staff. Extramural academic training through educational leave programs is provided.
16. A large part of CDA research program is concerned with regional problems; 62% of operating funds are expended on regional research, 38% on national programs. On a geographic basis, operating funds are distributed as follows: Atlantic Provinces 10%, Quebec and Ontario 15.8%, Prairie Provinces 27%, British Columbia 8.9%, Territories 0.3%. Of a total of 68 establishments, 52 are primarily concerned with regional research. On a geographic basis these are distributed as follows: Atlantic Provinces 8, Quebec 8, Ontario 9, Prairie Provinces 17, British Columbia 8, Territories 2. The regional programs and contributions to regional development are indicated in Sections 2.1.c, 2.9.1, and 2.8.
17. Of a total departmental personnel strength of 9,506, 3,948 or 41.5% are engaged in 'scientific activities'. Of the total number of positions allocated to scientific activities, 26% are for scientific and professional staff, i.e. three support staff for each scientific and professional staff member.
18. For the past 7 years, an annual average of 18 postdoctoral fellows have been accommodated in CDA establishments.
19. Of 1208 professional staff members, 70% are of Canadian birth.
Of the professional staff, 46% hold doctorate degrees, 23% masters degrees, and 31% bachelors degrees. Of those with doctorate degrees, 30% obtained their degrees from Canadian universities, 43% from U.S. universities. Of those with masters degrees, 66% obtained their degrees from Canadian universities, 17% from U.S. universities. Of the currently employed Ph.D's, 39% are of foreign birth.
20. While records are incomplete, only about 13% of professional staff are known to be bilingually effective.
21. In the 5-year period, 1963-68, there has been an increase in professional staff of about 15%. The average separation rate for doctorate and master staff is about 6% but for bachelors about 12%.
22. During the current year there are 25 professional staff members on educational leave, 20 of these candidates for the doctorate degree.

23. University students are employed during the summer as student assistants. About 180 are employed each year but others are also employed in seasonal positions.
24. Total expenditure on scientific activities has increased from \$30 million in 1962-63 to \$44.6 million in 1967-68. The break-down of expenditures is given by function and by unit.
25. The cost of educational leave of staff has increased from \$42,100 in 1962-63 to \$173,400 in 1968-69. The number of staff members on educational leave has remained at 20 to 25.
26. The 'Project System' currently in use in the Research Branch for selection, initiation and monitoring of projects is described and the manner in which program areas are reviewed is indicated. A similar statement of procedures in the Economics Branch is presented.
27. The inadequacy of current program and project priority determinations is recognized and attempts are being made to adopt more sophisticated techniques in place of the subjective assessments presently used.
28. Contractual arrangements, in support of intramural programs and for the development of research in areas where research cannot be undertaken and is urgently required, are provided by CDA with non-federal agencies through the 'Extramural Research Contract Grants' plan. In the last five years the total amount of these contracts has been maintained at about \$145,000 and the number of contracts has varied from 22 to 36. Most contracts are made with Canadian universities.
29. Commencing in 1966, a series of nine contracts have been arranged in connection with the development of the Canadian Farm Management Data System (CANFARM).
30. In order to increase the volume of high quality agricultural research in Canadian universities and increase the number of well-trained agricultural scientists, CDA initiated in 1966 an Operating Grants program to complement the NRC grants program. In the three years that the CDA Operating Grants program has been in effect, the total amount of the grants has increased from \$304,000 to \$650,000 and the number of grants has increased from 71 to 144. The program is intended to promote an optimum balance of research between governmental and university agencies.

31. Changes in programs, whether in response to changing technical environment or to normal extension of existing programs, or to the appearance of new problems, are considered in the light of individual circumstances insofar as the allocation of facilities or commitment of staff are concerned. The difficulties imposed by these sudden changes derive from the necessity of operating within fixed financial resources but principally from the need of recruitment of specialist staff or resistance to relocation of existing staff.

32. The transfer of research results to other research scientists, and to those technically trained persons whose responsibility is in the interpretation and extension to the ultimate user, is principally through publication in scientific journals. While primary responsibility for extension rests with the provincial authority, CDA recognizes the need for performing this function where it is not fulfilled.

In the transfer of information to other agencies and to the general public, CDA Information Division employs 36 information specialists and is expending over one million dollars in the current fiscal year. The media employed include radio, television, farm press, daily press, periodical and non-periodical publications, and exhibits.

33. CDA does not usually patent the results of its research unless it is in the interest of the farming population it serves. New varieties of crop species are, however, licensed primarily to protect growers and provide stability in grades and markets. Breeders' rights are not maintained in Canada since most new varieties are the product of governmental or university research. CDA research has produced over 150 new varieties within the last 10 years, many of them responsible for greatly increased monetary returns to the agricultural economy.

34. A measure of the output of the CDA research effort may be obtained from the number of journal publications produced by its staff. In the last 5 years over 800 scientific publications and over 360 miscellaneous publications per year have appeared. In addition, special reports covering research activities are prepared for the information of other research agencies and for industry.

35. CDA scientists participate in national and international conferences and their contributions are widely recognized.

36. CDA provides a means of transfer of foreign scientific information through scientific publication by staff members, through review papers and in-house periodicals, through information offices, through its library facilities, and through participation and support of the Commonwealth Agricultural Bureaux abstracting journals.
37. Former employees of CDA have attained prominence in governmental and industrial positions. But undoubtedly they have made their greatest contribution in university research and teaching. There are 95 former CDA staff members on the faculties of Canadian universities alone at the present time.
38. Research teams have been developed in a number of important areas. Of those listed, most have been functioning for longer than 5 years and have established international reputations.
39. Examples of CDA research contributions to the advancement of scientific knowledge and to Canadian economic development are numerous. Selected examples are presented.
40. The list of research projects for 1968 is appended and shows the following numbers of projects: Research Branch 1,417; Animal Pathology 119; Economics 71; Grain Research 34. Projects are number coded to show program areas.
41. Examples of outstanding research accomplishments are cited to illustrate how coordination of the program has contributed to their success.

RECOMMENDATIONS

1. Because there are several agencies (federal, provincial, university and industry) engaged in agricultural research;
because each agency has a different primary objective;
because of the continually changing problems and the type and magnitude of the research activities conducted by each of these agencies;
because of the danger of undesirable duplication or neglect of important areas of research;
the need of a central mechanism, representative of agencies, disciplines, and geographic areas, is a fundamental requirement for coordination of agricultural research and development, education and extension.

The Canadian Agricultural Services Coordinating Committee, as presently constituted, is capable of meeting this requirement. A more detailed statement of its responsibilities and a more active program to meet these responsibilities are needed. Clarification of CASCC responsibility in the agricultural sphere relative to that of the Science Council is also required.

2. Agriculture is a rapidly changing industry, confronted with an increasing demand for research and development. Increased staff will be required with sophistication of equipment and facilities comparable to that in other research areas. Because of the many regional research problems, the number of different crops produced, the multiplicity of disciplines that must contribute, agricultural research may be expected to have a greater requirement for resources relative to the industry's output than other industries, a commitment that will, nevertheless, have to be justified on a cost-benefit basis.

While only a nominal growth rate of about 3% is suggested for the Canada Department of Agriculture, an immediate increase in university research funding is required for the training of agricultural scientists to meet both current and future needs.

If provincial departments of agriculture are to assume full responsibility for extension, a considerable increase in funds will have to be assigned.

Dependence by input and output industries on government and university research and on research performed outside Canada should

not be encouraged. Incentives and assistance should be provided to increase the industrial intramural research effort.

5. Selected university centres of specialization should be designated and supported to avoid the over-diversification manifest in Canadian universities today. Special attention should be given to universities in the Province of Quebec in order to increase the supply of trained scientists capable of communicating in the French language.
4. Universities must be encouraged to make greater use of our scientists and facilities in research education beyond the graduate level.

In addition, early selection and support of promising Canadian students and increased opportunity for their participation in CDA research programs would improve the fit and calibre of recruits to meet staffing requirements.

5. As the programs of the provincial governments mature, emphasis by the Canada Department must be on supporting rather than usurping or duplicating efforts in research, development and extension. There should be a concomitant freeing of federal resources for attack on broad regional and national problems.
6. Further regional centralization must be equated with departmental requirements for expertise in agriculture, opportunity for awareness by scientists of present or potential problems and needs, and the
7. importance of ensuring that the efforts of scientists are focused on problems of the Canadian agricultural industry.

Greater effort must be made to convince the farming industry of the economic advantages of adopting innovations provided by research. This can best be achieved by actual commercial pilot demonstration in which the farmer and government participate jointly.

Introduction1. Importance of Agriculture in the Canadian Economy

Agriculture is the most important primary industry in Canada. It provides employment, at the farm level, for approximately half a million people. This is about three times as many persons as are employed by all other primary industries combined. An additional 300,000 persons are employed by manufacturing industries using products produced by Canadian farms.

The total value of farm products sold in 1967 was \$4.4 billion. The agricultural industry also contributed to the national economy by purchasing goods and services valued at \$2.6 billion in 1967, thus providing jobs for many additional workers. A further indication of the importance of the agricultural industry is its ability to earn foreign exchange. From 1963-67 an average of 18 per cent of total exports were agricultural products. While total exports exceeded total imports by only \$191 million during this same period, agricultural exports exceeded agricultural imports by \$563 million. Had it not been for the productive ability of Canada's 400,000 farms the balance of payments would have been negative. On average about one-third of our agricultural produce is exported.

The number of people directly employed in the production of food and the number of farms has been decreasing while at the same time the physical volume of agricultural production has increased. From 1946 to 1966 the farm labor force declined from 1,186,000 to 543,000 persons. During the same period production increased 74 per cent. Agriculture is a growing industry in terms of total production, investment, and output per man hour. It is declining in terms of the number of people employed and its share of the gross national product. In other words, despite the growth of the agricultural industry it is not growing as rapidly as a number of the secondary industries.

Agricultural research has traditionally been supported by public funds because the structure of the agricultural industry is characterized by a very large number of relatively small units. In 1966, the average investment in land, buildings, machinery and livestock was only \$44,307 per farm. The vast majority of the 430,522 farmers enumerated that year did not have a hired man.

Farmers are individually incapable of undertaking or financing scientific research. Collectively they have accomplished little because their efforts have been directed toward the establishment of more orderly markets and higher

prices. There is limited incentive for farmers or other individuals to undertake agricultural research because most improved tillage practices, breeding programs and management practices cannot be patented. Thus, there is little reward to be gained for attempting to find improved techniques.

The only institutions interested in financing sophisticated research have been universities and government departments. Some research, particularly that related to mechanization and pesticides, has been financed by private companies. Although commercial enterprises will continue to contribute to the body of agricultural technology, Canadians would be shortsighted to depend upon them. Since most of these companies are foreign owned, their researchers will tend to conduct most research in the parent country and the benefits will be provided to Canadian farmers at a cost determined by the incentive for profits.

Past investments in agricultural research have proven profitable. The Economic Council of Canada estimates that agricultural labor productivity is increasing at the rate of 5.5 per cent per year. It attributes 36 per cent of this increased productivity to the decreased number of farmers, 31 per cent to improved capital and material inputs and the remaining 33 per cent to all other changes. Thus, most of the increased productivity of Canadian agriculture can be traced directly to the application of improved machinery, new varieties, high analysis fertilizers, crossbred livestock, improved feeding programs, and modern farm management practices. The increased productivity of Canadian farmers would not have been possible had it not been for a substantial public investment in research. For example, in 1941, the average poultry flock produced 140 eggs per layer, the average dairy cow could produce 3,750 pounds of milk and it took 6 pounds of feed to produce a pound of poultry meat. Today the average hen produces 200 eggs, the average dairy cow gives 6,500 pounds of milk and a broiler eats only 2 pounds of food while gaining one pound weight.

Despite gains in productivity Canadian farmers are still not as productive as their American counterparts. The Economic Council of Canada believes Canadian farmers produce on the average 25 per cent less than U.S. farmers. It attributes much of this difference in productivity to differences in yield technology in both crop and livestock production. Labour productivity in the United States has gained more and reached a higher level as a result of more intensive application of yield technology rather than more rapid advances in

mechanization. One of the reasons for the higher productivity of American farmers is the greater emphasis on maximizing the adoption of innovations. Research results cannot increase the productivity of Canadian farmers unless they are applied. Social research is needed as well as physical research.

It is in the nation's interest for Canadian farmers to increase their productivity. More efficient farmers will continue to produce relatively inexpensive food for domestic consumption and be able to compete in world markets. All Canadians benefit from the development and application of improved agricultural technology.

2. Expenditure on Agricultural Research in Canada

"Government spokesmen on scientific matters are often asked about the most appropriate scale of total national spending on science and technology"^{1/}

"... the criterion most frequently used in assessing total national spending is probably that of international comparison, leading perhaps to a political decision that a higher target for science spending is necessary if the nation is to achieve its proper place in the international "league-table". This approach can be justified up to a point, particularly if it stimulates genuine laggards to a more vigorous effort. But certain conditions must be observed, if this "league-table" approach is not to produce its own dangers"^{1/}

"... as we have seen, political commitment in the defence, space and nuclear fields can have a very important influence on the level and distribution of total national expenditure on R and D. Thus, when there are national differences in such political commitments, there is little point in making international comparisons of gross national expenditure on R and D. It is necessary to break down aggregate figures into such categories as industrial research, agricultural research, military and space research, and university research. Within these more homogeneous categories, international comparisons can have some useful purposes".^{1/}

Unfortunately, good international comparisons of R & D in agricultural science are not available. Statistical tables issued by the OECD are blank

^{1/} Government and Allocation of Resources to Science, Organization for Economic Co-operation and Development, Paris, 1966, p. 50.

in most of the critical places.^{2/} It is, however, possible to compare Canadian agricultural R & D expenditures with Gross Farm Product.^{3/} For 1966, GFP was \$3,182 million. Total agricultural R & D is estimated at \$60.9 million or 1.9% of GFP. This compares with an estimated 1.33% for total R & D of GNP.

3. Research in the Canada Department of Agriculture^{4/}

In 1886 the Experimental Farm Stations Act laid the groundwork for the Experimental Farms organization which during the following 50 years expanded at a steadily increasing rate.

In 1937, reorganization of the Department set up four Services: Science Service, Experimental Farm Service, Production Service and Marketing Service.

Science Service comprised 5 research divisions: Entomology, Botany and Plant Pathology, Chemistry, Bacteriology and Dairy Research, and Animal Pathology.

Experimental Farm Service comprised 10 research divisions: Horticulture, Cereals, Forage Plants, Animal Husbandry, Field Husbandry, Tobacco, Poultry, Bees, Economic Fibre, and Illustration Stations.

In 1959 the former Services were replaced by 3 Branches: Administration, Production and Marketing, and Research. The Research Branch was formed by amalgamation of the former Experimental Farm Service and Science Service. The current organization of research functions in CDA is shown in Section 2.1.

The Canada Department of Agriculture research program is primarily concerned with problems of soils, crops, and livestock as they affect production and marketing. This program is necessarily supported by background research of a basic character, including national collections of soils, plants, insects, fungi and bacteria.

The program is concerned with soil classification, survey and mapping, and land capability assessment; with problems of soil fertility, salinity, acidity, irrigation, and drainage; with the production, processing and marketing of commercial crops including cereals, forages, field crops, fruits, vegetables, and ornamentals; with livestock production; with protection of

^{2/} See Tables T5 and T6, A Study of Resources Devoted To R & D .. OECD, Paris, 1968, pp. 64-67.

^{3/} The agricultural equivalent of GNP. Source of estimates: Farm Finance Section, Agriculture Division, Dominion Bureau of Statistics.

^{4/} Glen, R. Organization of the Research Branch of the Canada Department of Agriculture: an Historical Review. Agr. Inst. Rev. May-June, 1962, (Appendix 1.)

both crops and livestock from pests such as insects, fungi, bacteria, viruses, and weeds. Special attention must be devoted to winter hardiness and drought resistance, problems characteristic of our northern climate and continental extremes of much of the agricultural area.

In 1966 under the auspices of the Canadian Agricultural Services Coordinating Committee, an inventory of agricultural research projects in Canada was compiled by the Research Branch (Appendix 2.).

The Inventory included only research in progress under formal project status. It did not include much of the scientific activities normally included under "data collection", "scientific information" and "testing".

The Inventory disclosed that about 1200 man/years were devoted to agricultural research in Canada of which 68 per cent was in the federal department, 24 per cent in the universities and 8 per cent in provincial departments. No information on agricultural research in industry was included.

The distribution of agricultural research by establishments was as follows:

Canada Dept. of Agriculture	69 establishments
Other Federal departments	2
University departments	78
Provincial departments	32
	<hr/>
Total	181

The distribution of research by field of application was as follows;

Soils	15%
Crops	43
Animals	18
General Biology	14
Engineering	2
Economics	8

In 1968, Glen (Appendix 3) stated that 1500 professional man-years were devoted to agricultural research and development at a cost of \$55 million annually, and distributed as follows:

Federal	65%
University and provincial	25%
Industry	10%

By contrast, in the U.S.A. according to Maclay (Appendix 4), agricultural research is shared as follows:

Industry	53.9%
University and State	26.6%
Federal	19.5%

Reference to the need for greater participation by Canadian industry is indicated under Recommendations. (See also Section 2.2.c.(2) ii.)

2.1. Organization

2.1.a. Organization of the Canada Department of Agriculture

(Diagram 2.1.a.)

2.1.b. Parliamentary Reporting Channels

The activities of the Canada Department of Agriculture are summarized and transmitted by the Minister of Agriculture in his Annual Report to the Governor General of Canada. (Appendix 5).

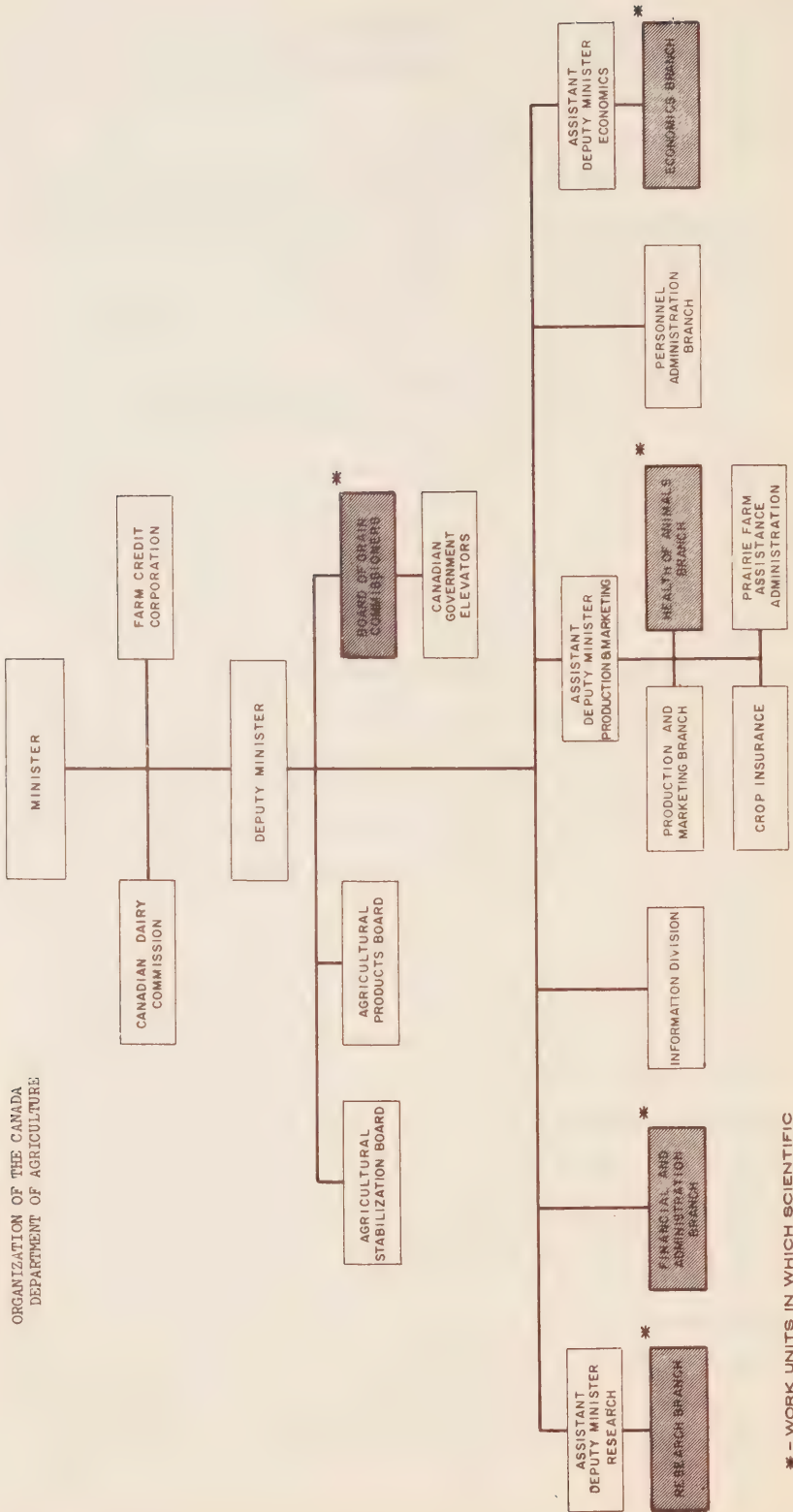
All units of the Department report through the Deputy Minister to the Minister of Agriculture.

The Canadian Agricultural Services Coordinating Committee, (Diagram 2.1.b.) acting as an advisory and coordinating body, also reports through the Deputy Minister to the Minister of Agriculture. This unique body includes as members the 11 Deputy Ministers of Agriculture, the 10 Deans and Principals of Faculties and Colleges of Agriculture and Veterinary Medicine, the Director of the Agricultural Research Institute of Ontario, the President of the Quebec Agricultural Research Council, a representative from the National Research Council, a representative from the Dominion Bureau of Statistics, and eight senior officials from CDA. It meets at least once a year, with the federal Deputy Minister as Chairman. Its purpose is "to review governmental and institutional services affecting the general welfare of Canadian agriculture, including coordination and adequacy of those services". A special section of the membership concentrates on research and education.

CASCC has established national coordinating committees in specific technical fields: weeds, soil surveys, soil fertility, agricultural engineering, agrometeorology, pesticide use and farm management. More recently regional coordinating committees have been formed in B.C., Alberta, Saskatchewan, Manitoba, Ontario, Quebec and one for the Atlantic Provinces to consider how best to use the total resources of staffs and facilities available in their respective areas. These committees differ from one another in composition and programs but each has at least one Deputy Minister of Agriculture, one Dean of Agriculture, and one Director of a CDA research station, thus ensuring participation of senior management with interests in extension, education, and research.

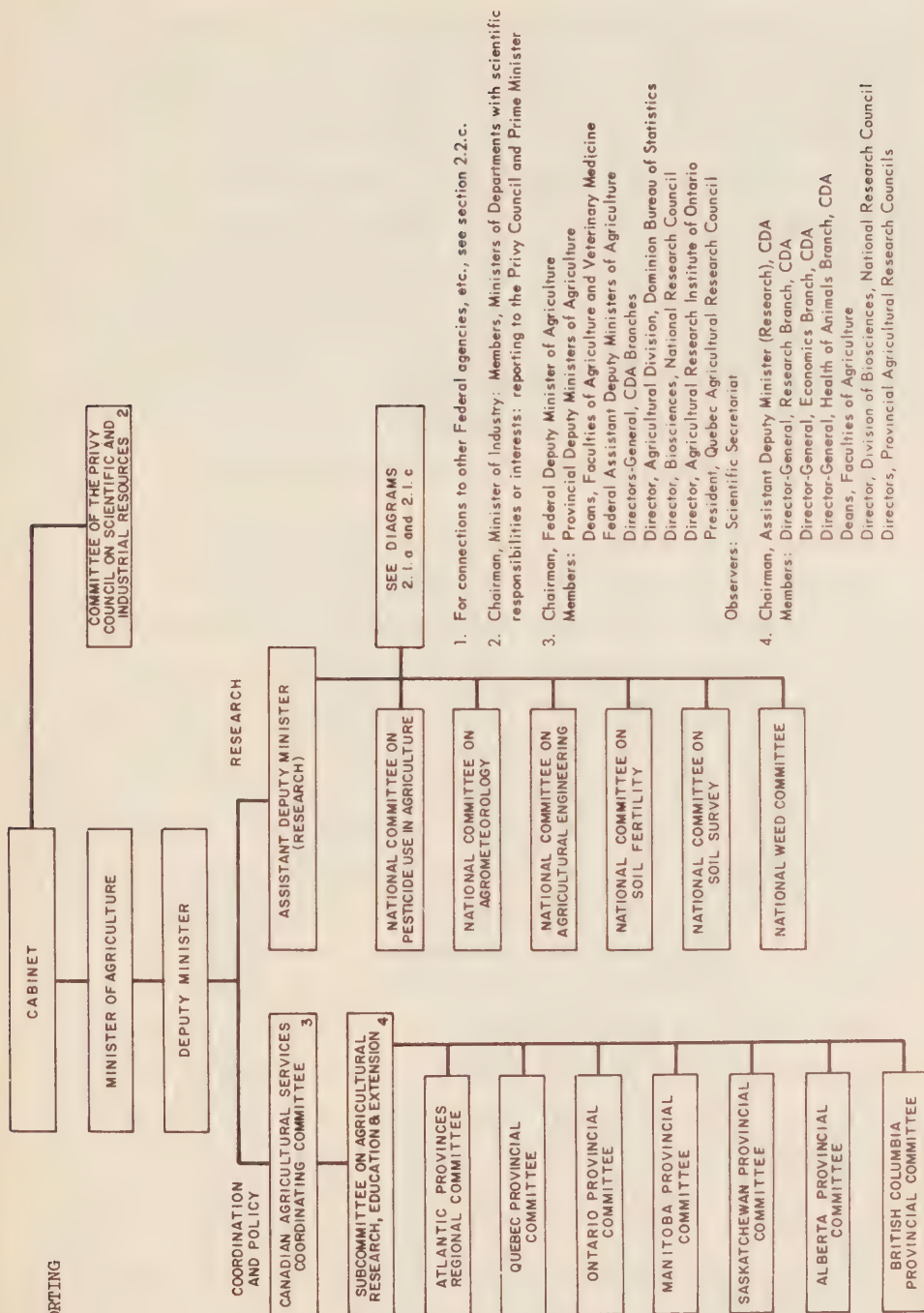
Agreement has been reached under CASCC on the distribution of responsibility for agricultural research. (See Section 2.2.c.).

DIAGRAM 2.1.a
ORGANIZATION OF THE CANADA
DEPARTMENT OF AGRICULTURE



* - WORK UNITS IN WHICH SCIENTIFIC
ACTIVITIES ARE CARRIED OUT

DIAGRAM 2.1.1.b
PARLIAMENTARY REPORTING
CHANNELS 1



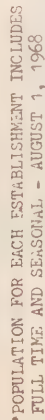
Guidelines have also been developed between CDA and the agricultural and veterinary colleges covering the use of CDA specialists as lecturers at universities and the use of CDA laboratory facilities for research conducted by graduate students. The CDA Operating Grants program in support of agricultural research at universities functions under a joint selection committee with CASCSC serving as an advisory body to the Department. In 1966, the Research Branch, CDA, prepared at the request of CASCSC, an Inventory of Agricultural Research Projects in progress in Federal and Provincial Departments of Agriculture and in Faculties of Agriculture and Veterinary Medicine in Canadian Universities. (Appendix 2). Major interest in CASCSC is centred at present on the problem of research management.

2.1.c. Organization of Units Responsible for Scientific Activities

Diagrams 2.1.c.1. to 2.1.c.5.

Not included in this report are those activities conducted in the Analytical Services Section, Plant Products Division, of the Production and Marketing Branch. The primary function of the Section is to provide analytical services on a variety of commodities (seed, feeds, fertilizers, pesticides, food products) for quality control and law enforcement purposes. Laboratories are operated at Ottawa and at several other locations across Canada. In support of this program, developmental research in analytical methodology is carried on at Ottawa, principally in analytical chemistry and in the technology of seed testing. In analytical chemistry, projects are in progress on the development of new or improved analytical methods for new active ingredients and new mixtures of active ingredients in commercial pesticide formulations, and for vitamins, antibiotics, drugs and pesticide residues in animal feeds. Work in the field of seed testing includes studies on methods of testing agricultural seeds for mechanical purity, laboratory germination and the presence of seed-borne pathogens, and for genetic purity of variety by means of morphological and biochemical characteristics of seeds, seedlings and plants. In all, about nine man-years are devoted annually to research activities.

Also excluded from the report are the operations research of the Board of Grain Commissioners in relation to grain handling and uniformity of quality control.



- (11) **RESEARCH STATION — ST. JOHN'S WEST, Nfld.**
Population 53 Establishment No. 300
Soil Science, Animal Science, Field Crop and Peat Soil Reclamation, Potato Breeding Vegetable Crops — entomology, nematology, pathology, horticulture
Administration, Farm Operations,
Support Services
- (12) **RESEARCH STATION — CHARLOTTETOWN, P.E.I.**
Population 92 Establishment No. 303, 304
Crop Protection — potato and vegetable diseases, forage diseases, potato fungicides potato insects, vegetable insects forage insects
Genetics and Plant Breeding — cereal breeding, cereal diseases, special crops, dairy cattle
Soils and Plant Nutrition — forage nutrition, plant physiology, pasture and corn nutrition, vegetable nutrition, chemistry and soil fertility, forage crop management
Administration — office services, agricultural services, building and maintenance, library
Exp. Fur Ranch — Summerside, P.E.I. — Nutrition, Breeding, Pathology, Administration, Farm Operations
- (13) **RESEARCH STATION — KENTVILLE, N.S.**
Population 174 Establishment No. 306, 307
Entomology — winter moth and locust scale, predator populations, ecology of mird pests, orchard tortricids, apple maggot, selective pesticides, toxicology, mites, aphids of apples and vegetables, small fruit pests
Chemistry — fertility and nutrition, pesticides
Plant Pathology — tree fruit diseases, storage diseases, fruit and vegetable diseases, physiology of parasitism in vegetable diseases
Crops — weed control, vegetable crops, field and forage crops
Plant Physiology — storage, post harvest physiology, tree fruit nutrition, electronic maintenance development
Processing — biochemistry, commercial processing techniques, techniques, food technology
Small Fruits — plant breeding, economic botany, genetics and cytology, ornamentals
Poultry — genetic environment, embryology and behaviour in egg production stocks, genetic environment and physiology in broiler stocks, poultry house operations
Tree Fruit — growth and development, breeding, orchard operations
Administrative Support — secretary, statistician, administration, library
Exp. Farm — Nappan, N.S. — Animal nutrition and management, pastures, forage physiology, cereal, forage crop management, soil fertility, dike land studies, blueberries, administrative and stenographic, statistical, farm operations.
- (14) **RESEARCH STATION — FREDERICTON, N.B.**
Population 157 Establishment No. 309
Animal Nutrition — meat animal nutrition, calf nutrition, pig nutrition, dairy cattle nutrition
Agricultural Engineering and Field Crops — harvesting and storage engineering, cereal crops, forage crops
Plant Pathology — aphid borne virus, potato virus, potato common scab, potato leafroll virus, late blight in potatoes, verticillium wilt, spindle tuber virus, biochemistry
Plant Physiology and Entomology — small fruits, vegetables blueberry insects, apple maggot control, potato physiology, analytical chemistry, herbicides, aphidology
Potato Breeding — potato breeding, potato quality, potato cytogenetics, potato genetics
Soils — soil chemistry, potato nutrition and management, potato nutrition, soil physics, soil capability
Administration — office services, building, vehicle & equipment maintenance, agricultural services, farm labour services
- (15) **RESEARCH STATION — QUEBEC, P.Q.**
Population 126 Establishment No. 328, 320, 336, 331
Cereal Crops — oats and barley
Forage Crops — grasses and legumes, plant pathology, plant physiology
Vegetable Crops — potatoes, plant physiology
Soils — soil genesis, microbiology, fertility, drainage
Administration — office services
Exp. Farm — La Patisserie — Cereal crops, forage crops, field crops, horticultural crops, soil fertility, animal science, administration, support services
Exp. Farm — Normandin, P.Q. — Animal science, crops, administration, support services
Exp. Farm — Caplan, P.Q. — Animal science, crops, administration, support services
- (16) **RESEARCH STATION — LENNOXVILLE, P.Q.**
Population 74 Establishment No. 326
Animals — dairy cattle, beef cattle, sheep, swine, general operations
Crop Research — forage grasses and pastures, forage pastures and legumes, cereal research
Soils Research — soil fertility, soil physics
Laboratories
Administration
Farm Operations
- (17) **EXPERIMENTAL FARM — L'ASSOMPTION, P.Q.**
Population 35 Establishment No. 324
Tobacco Breeding — Tobacco Crop Management, Tobacco Crop Protection, Forage, Cereal and Vegetable Crops Evaluation, Plant and Soil Chemistry, Poultry Breeding and Management, Administration, Farm Operations
- (18) **RESEARCH STATION — ST. JEAN, P.Q.**
Population 57 Establishment No. 335
Vegetable Research — Entomology (onions, potatoes, corn, canning peas) plant pathology (crucifers, beets), plant physiology, genetics, pesticide residues, management
Fruit Research — entomology (apples), genetics (apple trees), management (apple orchards)
Soils Research — soil chemistry, soil-plant relations
Administration — office services, maintenance
Exp. Farm — L'Acadie, P.Q. — Seasonal
Exp. Farm — St. Clothilde, P.Q. — Seasonal
- (19) **RESEARCH STATION — OTTAWA, ONTARIO**
Population 188 Establishment No. 338, 348, 346, 341
Cereal Crops — oats & barley, wheat & peas, wheat quality, plant pathology, plant physiology, field operations
Forage Crops — grasses & legumes, corn and soybeans, plant pathology, field operations
Horticultural Crops — vegetables, fruits, ornamentals, plant pathology, field operations
Agronomy — crop management, field operations
Cytology — cereal crops, forage crops, mutation genetics
Administration — office services, agricultural services, library
Exp. Farm — Smithfield, Ontario — Nutrition and irrigation, Fruit Crop Management, Tomato Breeding, Food Processing and storage, physiology and biochemistry, Administration, Farm Operations
Exp. Farm — Kapuskasing, Ontario — Animal science, Field Crops, Soil Science, Administration, Farm Operations
Exp. Farm — Fort William, Ontario — Crop Management, Administration
- (20) **RESEARCH STATION — HARROW, ONTARIO**
Population 94 Establishment No. 344, 345
Chemistry — Physiology — greenhouse crops, pesticide residues, greenhouse operations
Entomology — field crops, greenhouse crops, tree fruits, vegetables, chemical/biological control, aphids, vegetables, nematology, insect pathology
Field Crops — corn, soybeans, tobacco, crop adaptation
Horticultural Crops — tree fruits, vegetables, white beans, weed science, food technology, greenhouse operations, cereal crops
Plant Pathology — vegetables, tree fruits, soybeans, white beans, corn, soil microbiology, peach canker, greenhouse operations, soil toxins, fungicides
Soil Science — soil physics, soil fertility, statistical services
Administration — office services, engineering and maintenance, agricultural services, landscaping and grounds, library services, photography
Extension Services — tree fruits, greenhouse crops
Soils Sub-Station — Woodlee, Ontario

<p>Agonomy, Soil Physics, White Beans, Administration, Agricultural Service Entomology Field Office — Chatham, Ontario</p>	<p>2(1) ANIMAL RESEARCH INSTITUTE — OTTAWA, ONTARIO Population 223 Establishment No. 150 <u>Biochemistry Section</u> — ruminant ketosis and lipid metabolism, membrane structure and steroid analysis, mucopolysaccharides, white muscle disease, energy metabolism, nucleic acid and protein metabolism, hormones, cholesterol, experimental animals, general services. <u>Genetics</u> — protein genetics, enzyme genetics, dairy cattle genetics — dairy cattle field records, sheep genetics, poultry genetics — egg production, poultry genetics — meat production, population genetics — mice, population genetics — insects. <u>Nutrition</u> — forage utilization, beef cattle nutrition, dairy cattle nutrition, white muscle disease, poultry-protein, poultry-amino acids, poultry-egg quality. <u>Physiology</u> — reproductive, poultry, physiological genetics of poultry. <u>Institute Data Processing Committee</u> — computer systems, programmers, unit records <u>Resources Management</u> — special projects, animal plant, poultry plant, crops and services, large animal laboratory, small animal laboratory, labour pool <u>Administration</u> — personnel services, purchase, stores, inventory, accounts, revenue, typing and transcribing, general services.</p>	<p>2(4) CELL BIOLOGY RESEARCH INSTITUTE — OTTAWA, ONTARIO Population 54 Establishment No. 210 <u>Biochemistry</u> — bacterial metabolism, biosynthesis, fungal metabolism, macromolecules, tissue culture, biochemical taxonomy, viral biochemistry, enzyme regulation <u>Cyobiology</u> — frost hardiness mechanisms, frost resistance <u>Cytology and Electron Microscope Centre</u> — cytology, microorganisms, electron microscopy <u>Microbial Ecology</u> — rhizosphere bacteria, rhizosphere fungi, microbial selection, numerical taxonomy <u>Physiology</u> — fungal toxins, physiology of growth, growth regulators <u>Phytopathology</u> — of seed, soil borne diseases, bacterial diseases, seed borne diseases, bacteriophage, crop disease loss assessment <u>Virology</u> — cereal viruses, leathopper transmitted viruses, aphid and hypostomatid viruses, virus-vector relationships <u>Administration</u> — maintenance and stores, purchasing and payment, area stenographers.</p>
<p>1(11) RESEARCH STATION — VINELAND, ONTARIO Population 51 Establishment No. 352 <u>Entomology</u> — peach insects, apple insects, orchard mites, vegetable insects, insect reproduction <u>Nematology</u> — zoology research <u>Plant Pathology</u> — Fruit viruses, grape viruses, vegetable viruses, vegetable diseases <u>Pesticides</u> — tree fruits, zoological research <u>Administration</u> — office services, maintenance service, greenhouse service, farm service.</p>	<p>2(2) ENTOMOLOGY RESEARCH INSTITUTE — OTTAWA, ONTARIO Population 116 Establishment No. 190 <u>Administration</u> — office services <u>Agriculture</u> — ecology, pathology, pollination and nectar chemistry <u>Experimental Biology</u> — insect ecology, insect genetics and cytology, insect physiology <u>Insect Taxonomy</u> — acarology, aquatic insects, coleoptera, diptera, hemiptera, hymenoptera, lepidoptera, morphology, technical services, siphonaptera. <u>Nematology</u> — ecology, taxonomy</p>	<p>2(5) PLANT RESEARCH INSTITUTE — OTTAWA, ONTARIO Population 144 Establishment No. 220 <u>Agrometeorology</u> — ecoclimatology, micrometeorology, agronomy <u>Plant Pathology</u> — plant demography, plant physiology, plant growth and development, growth analysis, growth efficiency, <u>Mycology</u> — pyrenomycetes, mycology herbarium, parasitic fungi, phycocyanes, hyteraceae and hypodermataceae, hyphomycetes, agaricales and discomycetes, fungi imperfecti, hyphomycetes, polyporaceae, tremellales, hydnoaceae, wood-inhabiting hymenomycetes, uredinales, thelephoraceae and hydnoaceae <u>Ornamental Plants</u> — turfgrass, ornamental hort., physiology, biochemistry, native plants, frost hardiness <u>Vascular Plant Taxonomy</u> — saxifragaceae and experimental morphology, phanerogamic herbarium, pteridophyta, plantaginaceae, polynology, avenae, floristics, gramineae, cynareae, cyrtogenetics, leguminosae, experimental taxonomy, cruciferae, cytotoxonomy <u>Operations</u> — greenhouses, botanic gardens, ornamental gardens, arboretum, campus, nurseries, research plots. <u>Administration</u> — office services, stenographic services, stores services, library service, landscape architecture.</p>
<p>1(12) RESEARCH STATION — DELHI, ONTARIO Population 39 Establishment No. 343 <u>Nutrition and Soils</u> <u>Plant Science</u> <u>Plant Physiology</u> <u>Genetics and Plant Breeding</u> <u>Plant Pathology</u> <u>Entomology</u> <u>Technical/Group and Farm Operations</u> <u>Administration</u></p>	<p>2(3) FOOD RESEARCH INSTITUTE — OTTAWA, ONTARIO Population 60 Establishment No. 195 <u>Carbohydrates</u> — repeated, potatoes <u>Dairy</u> — cottage cheese, cheddar cheese, aroma, cheddar cheese flavour, milk enzymes. <u>Lipids</u> — plant lipids, animal lipids <u>Microbiology</u> — bacteriophage, lactic streptococci, fungal rots. <u>Food Processing</u> — new foods, freezing, sensory evaluation, chemical evaluation <u>Proteins</u> — muscle protein <u>Storage</u> — chemical analysis, senescence <u>Food Research Liaison</u> <u>Administration</u> — office services, farm labour services, scientific support services</p>	<p>2(6) SOIL RESEARCH INSTITUTE — OTTAWA, ONTARIO Population 135 Establishment No. 230 <u>Soil Fertility</u> — potassium, phosphorus, soil environment, nutrient isotopes, management <u>Soil Mineralogy</u> — mineral transformation and weathering <u>Physical Chemistry</u> — ionic interactions and equilibria in soils</p>

Soil Biochemistry — organic nitrogen, microbial decomposition, phenolic chemistry of humus and plants Humic Acid Chemistry — properties and structure, biodegradation Soil Physics — soil moisture distribution Pedology — classification and correlation, genesis Alberta Pedology Unit Ontario Pedology Unit Nova Scotia Pedology Unit Administration Cartography	2(10) ENGINEERING RESEARCH SERVICE — OTTAWA, ONTARIO Population 39 Establishment No. 144 Research Service Development and Advisory Scientific and Technical Information	Method Research — inorganic chemistry, physical chemistry, organic chemistry, pesticide residues Analytical Cooperation — special analyses, proximate constituents, instrumental, technicians pool Administration	3(1) PROPERTY AND FINANCE — OTTAWA, ONTARIO Population 38 Establishment no. 134 Finance Unit — operations, purchasing General: Administration — central registry, office services, typing and transcribing
2(7) RESEARCH INSTITUTE — BELLEVILLE, ONTARIO Population 86 Establishment No. 250 Biting Fly Biology — fecundity, chemical sterilants, experimental populations, predators, physical sterilants, reproductive behaviour Nutritional Physiology — nutrition, histology, antimetabolites, growth, host preferences, reproductive physiology Population Analyses — experimental populations, ants, spiders, aphids, mirids, apple maggot, host-parasite interactions. Insect Plant Relations — biological control of weeds, control of Canada Thistle, feeding behaviour, bioenergetics Microbial Controls — insect pathogens, European skipper, viruses, bacteria Insect Imports and Exports — Administration — library, office services, building maintenance	2(11) STATISTICAL RESEARCH SERVICES — OTTAWA, ONTARIO Population 21 Establishment No. 147 Biometrics Quantitative Genetics Computing — data analysis, programming Office Services	3(2) ARCHITECTURAL AND ENGINEERING, OTTAWA, ONTARIO Population 14 Establishment no. 135 Structural Engineering Plumbing and Sewage Environmental Control Heating and Ventilation Electrical Engineering Laboratories, Coordinator Mechanical Systems Animal Structures Service Buildings Design (drafting)	3(3) SCIENTIFIC INFORMATION — OTTAWA, ONTARIO Population 52 Establishment no. 136 Technical information — insecticides, herbicides, fungicides, insect pest surveys, plant disease surveys Public Information — general information, herbicides, farm management, press, radio, T.V. Information Processing — systems, projects Illustrative — photography, micrography, photo engineering, arts, modelling, biological art, special projects, photo library Scientific Editing — research reports, soil surveys, departmental publications Administration — fellowship grants, office services
2(18) RESEARCH INSTITUTE — LONDON, ONTARIO Population 81 Establishment No. 280 Bacteriology — electron microscopy and cell cytology, microbiology and virology Chemistry — biophysical, organic chemistry and fungicides, radioactive tracers, photochemistry and fungicides natural products, enzyme kinetics, comparative biochemistry and toxicology, chemistry-toxicology Entomology — comparative biochemistry and toxicology, biochemistry, physiology and biochemistry, physiology Fumigation — fumigation, fumigation and toxicology, analytical chemistry Plant Pathology — histology and physiology, fungicides, plant biochemistry and fungicides Plant Physiology — herbicides, physiology, biochemistry Soil Pesticide Behaviour — toxicology, analytical chemistry, microbiology, ecology Administration — office services, engineering services, stores, library, greenhouse, photography	2(9) ANALYTICAL CHEMISTRY RESEARCH SERVICE — OTTAWA, ONTARIO Population 34 Establishment No. 141	3(4) OTTAWA SERVICES — OTTAWA, ONTARIO Population 108 Establishment no. 138 Administrative Unit — general administration, receiving, shipping, taxi, building maintenance Technical Unit — modification of special equipment, operation and maintenance, instruments General Unit — farm machinery and vehicle shop, carpenter-shop, farm operations	

- 4(1) **RESEARCH STATION – BRANDON, MAN.**
Population 76 Establishment no. 360
Plant Science – cereal crops, barley breeding, forage breeding, forage management, horticulture crops
Animal Science – poultry breeding, apiculture, animal breeding, animal physiology – reproduction (male), reproduction (female), meats
Soils and Agronomy – soil fertility, plant phys., agronomy – rotation and off-stations cultural practice, weeds
Administration – office services, operations and maintenance
- 4(2) **RESEARCH STATION – WARDEN, MAN.**
Population 83 Establishment no. 362
Information Services
Administration
Corn and Soybeans
Weed Control
Vegetable Crops – tomatoes and potatoes, vegetable quality, plant physiology, crop management, sweet corn and cucumbers, plant pathology
Special Crops – flax and cereals, buckwheat and peas, oilseed quality, sunflowers, plant pathology
Ornamentals and Fruit
Operations and Maintenance
Sub-Station – Portage La Prairie, Man.
- 4(3) **RESEARCH STATION – WINNIPEG, MAN.**
Population 111 Establishment no. 364
Cereal Rusts – common wheat breeding, Durum wheat breeding, wheat rust pathology, wheat leaf rust, oat crown rust, physiology
Cereal Diseases – barley breeding and genetics, cereal pathology, antibiotics, cereal smuts, cereal viruses, virology
Crop Protection – insect biology and control, insect toxicology, insect and mite ecology, population dynamics, insect biochemistry, pesticide residues, plant pathology, fumigant biochemistry
Pedology – classification, chemistry, classification and genesis, classification and cartography
Cereal Chemistry – scientific liaison
Administration – mechanical maintenance, photography, support services, building and ground maintenance.
- 4(4) **EXPERIMENTAL FARM – INDIAN HEAD, SASK.**
Population 43 Establishment no. 370
Agronomy
Forage Crops
Experimental Project Farms
Soil – Horticulture
Poultry
Administration – office services, maintenance services, farm service
- 4(5) **RESEARCH STATION – MELFORT, SASK.**
Population 50 Establishment no. 372
Ruminant Nutrition and Pasture Research
Swine Nutrition
Forage Production and Pasture Research
Forage Ecology and Weed Control
Soil Fertility and Pasture Research
Grey-wooded soils
Tillage and Cropping
Cereal Crops
Horticulture
Administration
Farm Operations and Upkeep
- 4(6) **RESEARCH STATION – REGINA, SASK.**
Population 34 Establishment no. 347
Weed Science – weed physiology, range weeds, weed morphology, herbicide chemistry, weed ecology, weeds of field crops
Cereals and Seeds – cereal testing, seed distributions, var. verify, and genetic stock.
Administration
Maintenance
- 4(7) **RESEARCH STATION – SASKATOON, SASK.**
Population 139 Establishment no. 375, 377
Administration – office services, library computer systems, program services, photographic services, greenhouse services, maintenance services, glassware washing service, farm operations
Scientific Information
Crops – grass breeding, legume breeding, oilseed crops – rapeseed, sunflower, mustard, crop management, irrigation, cytology, field operations
Insect Bionomics and Control – forage crop insects, forage crop insect pollinators, biting flies, mosquitoes, oilseed insects, pesticides, insect toxicology, garden insects, field operations
Insect Ecology – grasshoppers, wireworms, insect nutrition, mosquito physiology, insect reproductive physiology, insect endocrinology, field operations
Plant Pathology – field operations
Plant Pathology – cereal root rots, soil microbiology, physiology of drought resistance, legume diseases, oilseed crop diseases, grass diseases, field operations
Pedology – pedological characterization, soil analysis
Experimental Farm – Scott, Sask. – Crop management and weed control, soils research, potato investigations, crop research, administration, farm operations
- 4(8) **RESEARCH STATION – SWIFT CURRENT, SASK.**
Population 144 Establishment no. 379
Administration – office services, operations and property management.
- 4(9) **RESEARCH STATION – BEAVERLODGE, ALTA.**
Population 112 Establishment no. 380, 383, 395, 410, 420
Agronomy and Weeds
Cereals and Horticulture – horticulture breeding, horticulture management, cereal crops, oilseed crops
Soils – organic matter studies, nutrient availability, cultural studies
Forage Crop Breeding and Seed Production – legume seed production, apiculture, grass breeding, legume breeding, grass seed production
Forage Production and Management – pasture management, ecology
Administration – office/operations, farm operations, greenhouse operations, special services
Experimental Farm – Fort Vermilion, Sask. – Administration, crop research, farm operations
Experimental Farm, Fort Simpson, N.W.T. Crop Management
Experimental Farm – Prince George, B.C. – Office and farm operations, horticulture, soils, forage, dairy cattle
Experimental Farm – Mile 1019, Yukon – Crop management, farm operations
- 4(10) **RESEARCH STATION – LACOMBE, ALTA.**
Population 99 Establishment no. 385
Animal Science – animal breeding, animal physiology, breeding and genetics, poultry, beef cattle and lab animals, swine breeding and meats
Plant Breeding – cereal crops – oats and barley breeding, forage crops – breeding and management, horticulture, plant pathology – cereals, forage
Crop Management and Soils – weed research, soil chemistry, plant nutrition, tillage and soil physics, operations
Administration – office services, operations and property management
Soil Research sub Station – Vegreville, Alta.
Administration – office services, operations and property management.

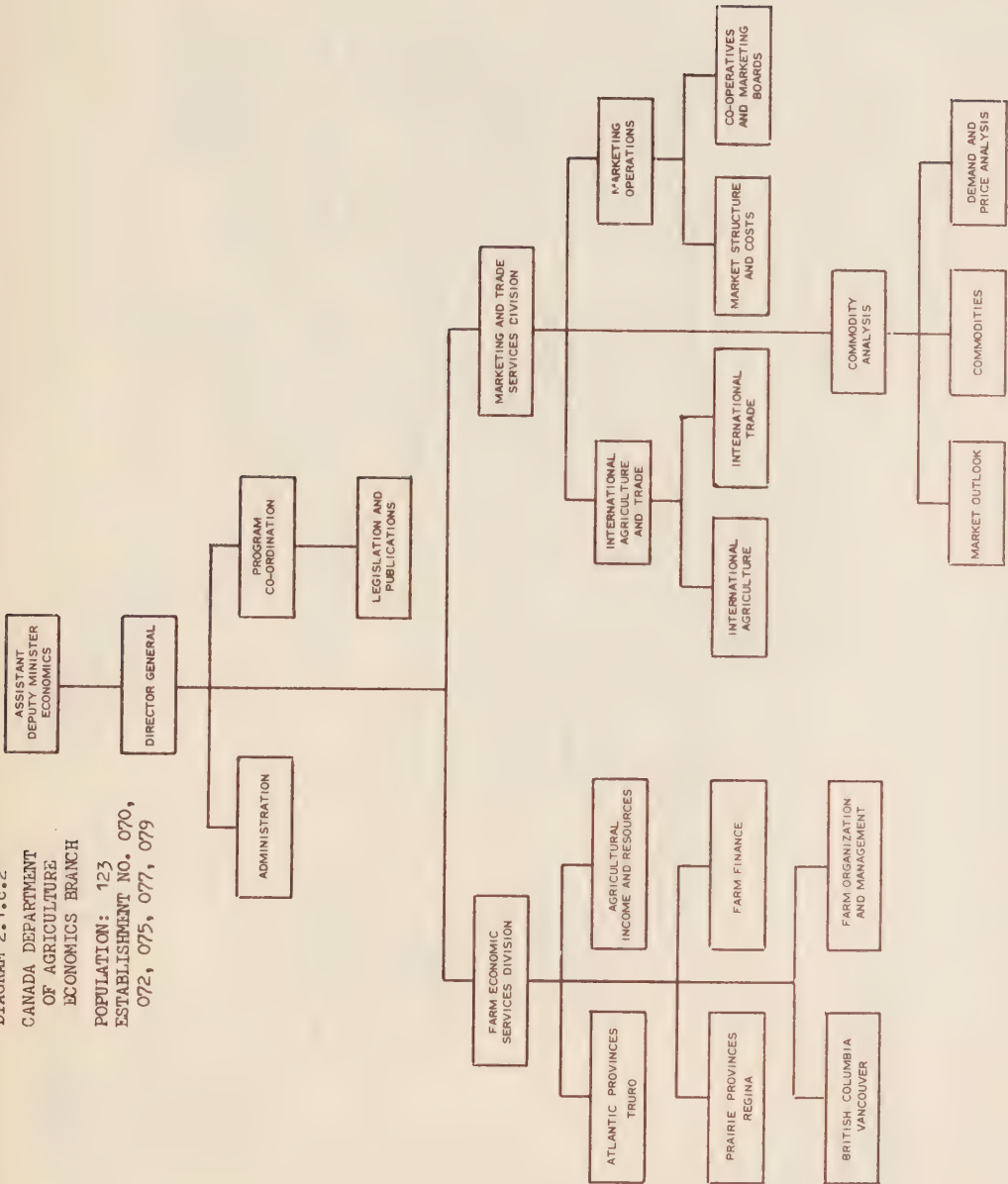
Administration Section — administrative services, office services, greenhouse services, photography, electron microscopy, maintenance services
Regional Library — library services

- 4(11) **RESEARCH STATION — LETHBRIDGE, ALTA.**
Population 311 Establishment no. 387
Soil Science — agricultural engineering, dryland agronomy, irrigation agronomy, plant nutrition and chemistry, irrigation efficiency, organic and genesis chemistry, pesticide residue chemistry, microbiology, physics and physical chemistry, drainage engineering, land classification, technician operations, field operations
Plant Science — cytogenetics, cereal breeding, alfalfa breeding, vegetable breeding, vegetable culture, crop management, pasture ecology, range ecology, weeds, food technology, field operations
Plant Pathology — winter survival, cereal diseases, forage diseases, vegetable diseases, crop residues
Crop Entomology — wheat stem sawfly, aphids, cutworms, grasshoppers, pollinators, forage pests, sugar beet insects, special crop insects, insect attractants, toxicology, insecticide chemistry, cold hardiness biochemistry
Animal Science — wool, animal physiology, animal nutrition, animal breeding, poultry nutrition, technical unit, livestock unit, poultry unit
One-four Sub Station
Veterinary-Medical Entomology — bioclimatology, toxicology, serology, reproduction, physiology, histo-chemistry, biting flies, operations unit
Scientific Support
Administration — office services, construction and maintenance, photography, miscellaneous services, farm operations, grounds, greenhouse
Field Operations — Vauxhall
- 4(12) **RESEARCH STATION — AGASSIZ, B.C.**
Population 71 Establishment no. 390
Forage Crops — forage breeding, forage management
Horticulture — small fruit breeding, small fruit management, vegetables
Soils — soils fertility
Animal Science — dairy cattle research, poultry research
Administration — office services, farm operations
- 4(13) **RESEARCH STATION — KAMLOOPS, B.C.**
Population 42 Establishment no. 393
Animal Entomology — ticks, biting flies, chemical control
Forage Crop Insects
Range Management — ecology and management, plant physiology
Soil Science
Forage Crops — crop testing
Support Services — field directorate and support services, building, vehicle and equipment maintenance, farm operations
- 4(14) **RESEARCH STATION — SAANICHTON, B.C.**
Population 39 Establishment no. 398
Horticulture Crops — vegetables, weed control, entomology, ornamentals, turf grasses, small fruits, nematology, pathology, virus indexing
Soils and Plant Nutrition
Building, Vehicle and Equipment Maintenance
Farm Operations — greenhouse operations
Administrative Support Services — office services, library
- 4(15) **RESEARCH STATION — SUMMERLAND, B.C.**
Population 121 Establishment no. 402
Animal Science — bloat in cattle and forage, blood chemistry
Soil Science — plant nutrition, micro elements, soil moisture
Entomology — integrated control of tree fruit insects, control of codling moth, bionomics of pear psylla, control of orchard mites, taxonomy, biology of mites, biology and control of vegetable insects, pesticide chemistry
Vegetables and Ornamentals — vegetable breeding culture, physiology
Pomology — variety evaluation — thinning, fruit breeding — hardiness, agronomy — growth regulators, fruit storage
Agricultural Engineering — agricultural equipment development
Fruit and Vegetable Processing — candied fruit chemical compounds, eng. — new products, juice, jam, pie filling, microbiology, analytical chemistry, home economics
Plant Pathology — tree fruit virus diseases, vegetable parasite diseases, tree fruit parasite diseases, pome and veg. virus diseases, stone fruit and grape virus diseases
Administration — office services, photo services, farm and maintenance
Library Services
Creston Sub Station — cereals and forage crops
- 4(16) **RESEARCH STATION — VANCOUVER, B.C.**
Population 54 Establishment no. 404
Plant Pathology — potato viruses — serology, rootrot — horticultural crops, viruses — horticultural crops, nematodes, legume viruses, plant disease survey, field operations
Virus Chemistry and Physiology — physiology and electron microscopy, chemistry and virus hosts, biophysics and chemistry, biochemistry and virus hosts
Entomology — virus vectors, fine structures of virus vectors
Leafhopper virus vectors, ecology of vectors, chemical control of insects, biological control of insects, insecticide residues, small fruit insects, stored product insects
Soil Science Section — soil classification and capability, soil mapping-classification, soil capability-photo interpretation, soil mapping capability, soil mineralogy-genesis, forest capability

DIAGRAM 2.1.c.2

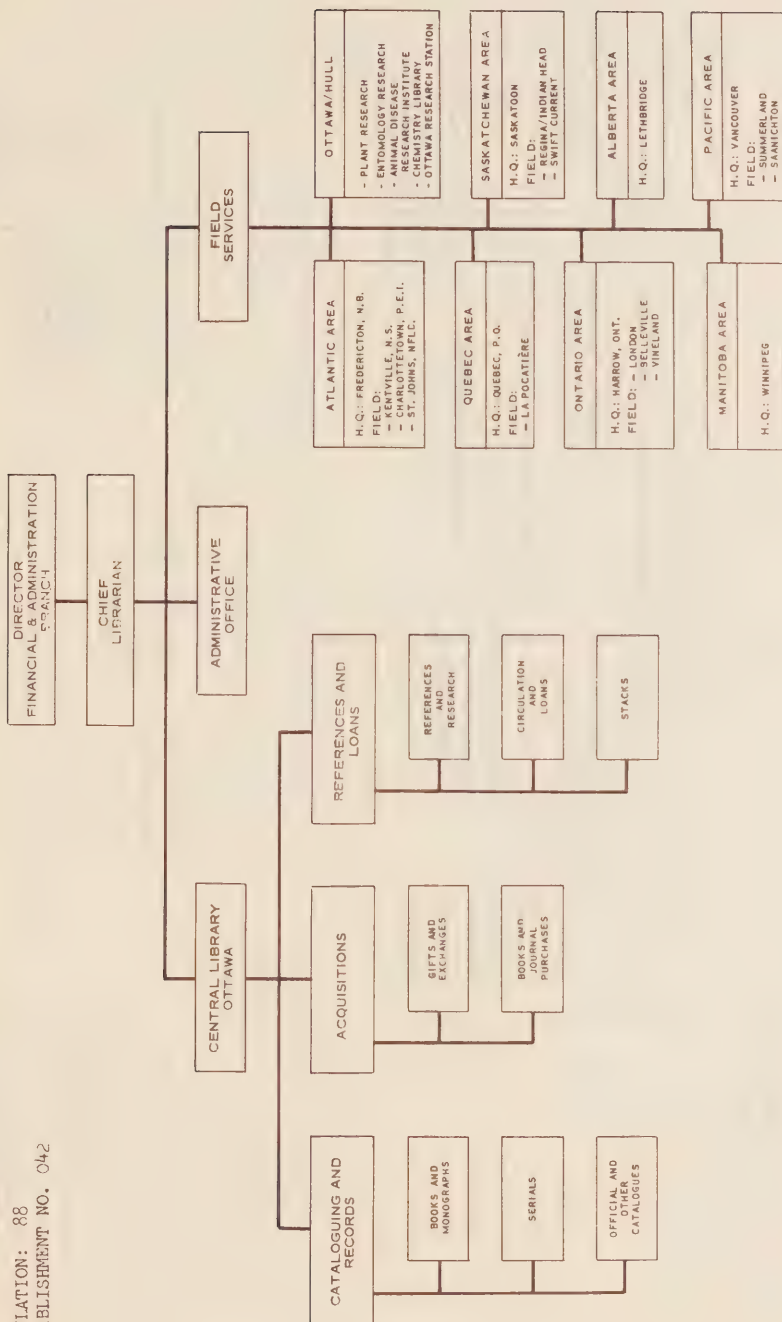
CANADA DEPARTMENT
OF AGRICULTURE
ECONOMICS BRANCH

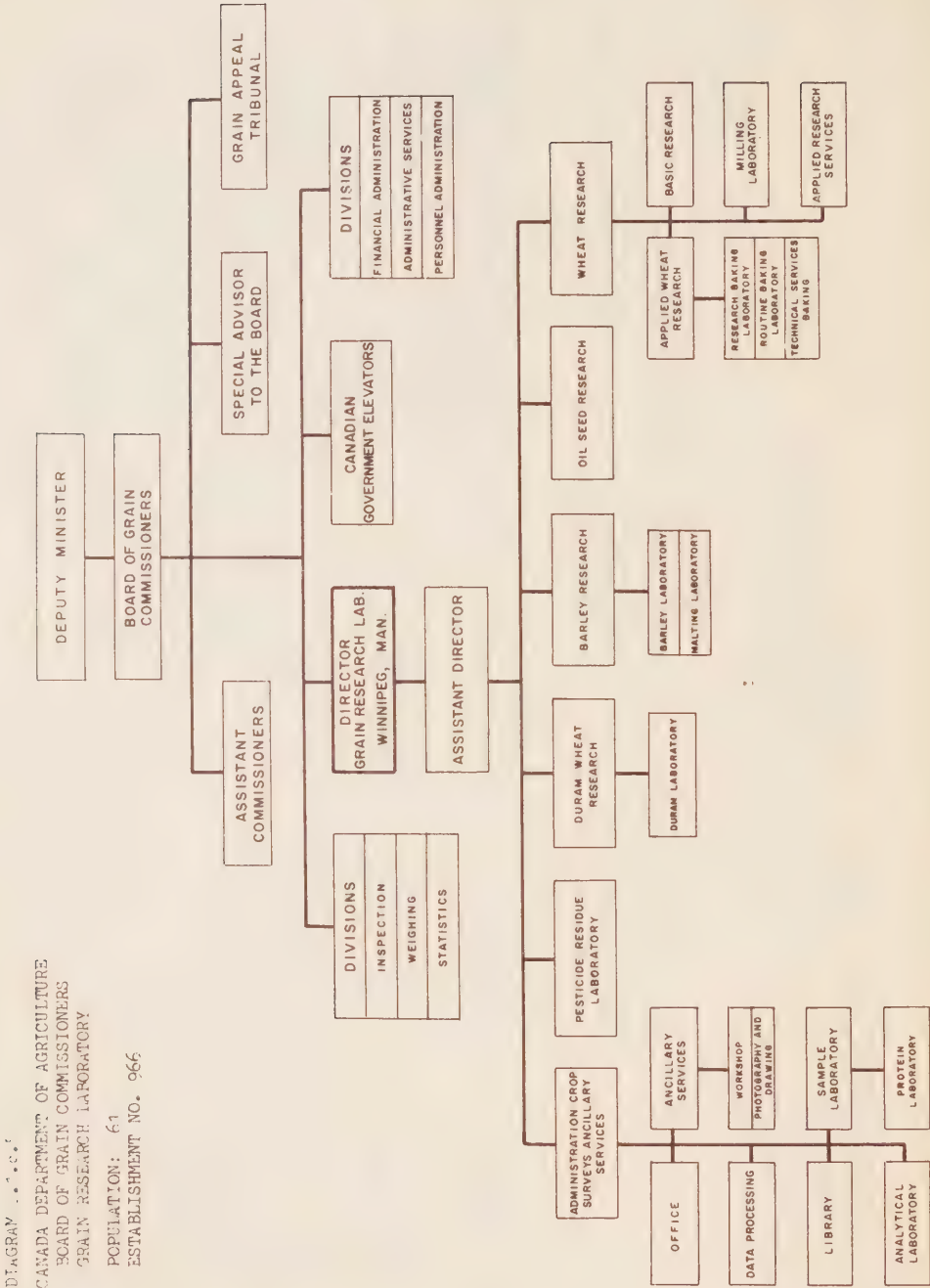
POPULATION: 123
ESTABLISHMENT NO. 070,
072, 075, 077, 079



CANADA DEPARTMENT OF AGRICULTURE
FINANCIAL AND ADMINISTRATION BRANCH
LIBRARY

POPULATION: 88
ESTABLISHMENT NO. 042





2.1.d. Formal Agreements with Agencies Outside Canada

(1) The Commonwealth Agricultural Bureaux. Extracts from Appendix I of 37th annual report of the CAB (1965-66) give a good account of this agreement:

"The Imperial Agricultural Research Conference, 1927, stressed (a) the need for scientists to be in touch with the progress of research throughout the world in their several branches, and (b) the difficulty therein owing to the great output of scientific literature and the diversity of languages in which it is published.

It is recommended the governments of the British Commonwealth to establish on a joint co-operative basis eight bureaux to collect, collate and disseminate information on research in eight selected branches of agricultural science, and generally to assist research workers in the Commonwealth and Empire with information relevant to their subjects.

Each Bureau was to be located at a research institute specializing in its own branch of science so that the bureau officers should be in daily contact with men engaged on research in its own subject. These bureaux were to be financed from a common fund contributed by Commonwealth governments in agreed proportions and controlled by a Council composed of representatives of those governments on an equal footing.

Governments accepted these proposals. In November 1928, a new type of inter-imperial co-operative agency acceptable to all governments was worked out in detail. On 1 April, 1929, the Executive Council of the Imperial Agricultural Bureaux came into being. The eight bureaux started work in that year. From 1 January, 1948, the name of the organization was changed to Commonwealth Agricultural Bureaux."

"The organizations under the administration of the Executive Council are:

The Commonwealth Institute of Entomology

The Commonwealth Mycological Institute

The Commonwealth Institute of Biological Control

The Commonwealth Bureaux of:

Animal Breeding and Genetics

Animal Health

Animal Nutrition

Dairy Science and Technology

Forestry

Helminthology

Horticulture and Plantation Crops

Pastures and Field Crops

Plant Breeding and Genetics

Soils

Editorial Office, WAERSA"

"The institutes and bureaux act as effective clearing houses of information for scientists and research workers in agriculture, animal health and forestry throughout the Commonwealth and, increasingly, throughout the world. To do this they collect information by scanning and indexing as far as possible all journals in their subjects in all languages, by scanning other abstracts, and by keeping in touch with research in progress. They distribute this information by the periodic issue of 17 abstract journals, by the frequent issue of monographs reviewing some particular subject within their field and by various other publications."

Contributions to the Bureaux budget are based on the FAO scale. Canada's contribution this year is 17 per cent of the total, amounting to \$366,000. In return, the Department receives 574 free quota subscriptions to the CAB journals, and allocates these to key organizations and people in the federal departments of agriculture and forestry, and to colleges and faculties of agriculture and forestry throughout Canada.

(2) Although the Department is intimately involved in the activities of the Food and Agriculture Organization of the United Nations and of the Organization for Economic Cooperation and Development, formal agreement on Canadian participation is a responsibility of the Department of External Affairs.

(3) International cooperative research arrangements on an informal basis are frequently made on the initiative of the individual or unit concerned. The extent of this international cooperation is indicated under Section 2.2.c.

2.1.e. Overseas Offices

The Department does not maintain overseas scientific offices but relies upon the Scientific Liaison Offices of the National Research Council to act on its behalf. These offices are located in Washington, London, Paris and Bonn.

We also rely upon agricultural counsellors and trade commissioners of the Department of Trade and Commerce for liaison on economic and other matters affecting Canadian agriculture.

2.2 ORGANIZATIONAL FUNCTIONS

2.2.a. Statutory Functions and Powers

The Department's statutory functions and powers regarding scientific activities are derived from its responsibility for agriculture under two Acts:

The British North America Act

The Department of Agriculture Act

and for agricultural research under two more:

The Experimental Farm Stations Act

The Canada Grain Act

Several other Acts, notably the Fertilizers Act, Feeds Act, Seeds Act, and Pest Control Products Act provide for analytical work, most of which - being routine - falls outside of the Senate Committee's definition of scientific activities.

(1) The B.N.A. Act

The B.N.A. Act (Section 95) provided for concurrent federal-provincial jurisdiction in the field of agriculture but gave the Dominion over-riding authority in case of conflict:

"In each province the Legislature may make laws in relation to agriculture in the province . . . ; and it is hereby declared that the parliament of Canada may from time to time make laws in relation to agriculture in all or any of the provinces . . . ; and any law of the legislature of a province relative to agriculture . . . shall have effect in and for the provinces as long as and as far only as it is not repugnant to any Act of the Parliament of Canada."

Other sections of the British North America Act also contain provisions affecting agriculture. The authority with respect to trade and commerce which was assigned to the Dominion (Section 91 (2)) is one of the most important; its significance has increased over the years as agriculture has become more specialized and as farm products have more and more entered into the nation's commerce.^{1/}

^{1/} "Agriculture, Reference Book for Dominion-Provincial Conference on Reconstruction", (undated) about 1945, p. 7.

(2) The Department of Agriculture Act

The Act for the organization of the Department of Agriculture was passed by Parliament and assented to May 22, 1868. This Act, amended from time to time, is the authority under which the present Department operates.^{2/} The pertinent provisions are to be found in Sections 4 and 5:^{3/}

4. The duties and powers of the Minister of Agriculture extend to the execution of laws enacted by the Parliament of Canada, and of orders of the Governor in Council relating to the subjects enumerated in section 5, as well as to the direction of all public bodies, officers and servants employed in the execution of such laws and orders. R.S., c. 4, s. 4.

5. (1) The following subjects are under the control and direction of the Minister of Agriculture, that is to say:

- (a) agriculture;
- (b) arts and manufactures;
- (c) Experimental Farm Stations.

(2) The Governor in Council may at any time assign any other duty or power to the Minister of Agriculture. R.S., c. 4, s. 5.

As of April 1, 1968, the Minister was charged with the duties and powers of 34 such laws,^{4/} most of which require scientific support for their efficient execution.

(3) The Experimental Farm Stations Act

The main bulk of the Department's research and development program, including scientific support for most of the 34 acts mentioned above, is more specifically provided for in the Experimental Farms Stations Act, passed in 1886. This Act gave the Governor in Council authority to establish "farm stations" across Canada, to acquire land for them and to hire staff (Sections 3, 4, 7 and 8). It also gave general direction to the research program (Section 9) as follows:^{5/}

- (a) conduct researches and verify experiments designed to test the relative value, for all purposes, of different breeds of stock,

^{2/} Canada Agriculture, The First Hundred Years, Canada Department of Agriculture, 1967.

^{3/} Revised Statutes of Canada, 1952, Chapter 66.

^{4/} Annual Report of the Canada Department of Agriculture, 1966-67, p. 6 (Appendix 5).

^{5/} Revised Statutes of Canada, 1952, Chapter 101.

and their adaptability to the varying climatic or other conditions that prevail in the several provinces and in the Northwest Territories;

- (b) examine into the economic questions involved in the production of butter and cheese;
- (c) test the merits, hardiness and adaptability of new or untried varieties of wheat or other cereals, and of field crops, grasses and forage-plants, fruits, vegetables, plants and trees, and distribute among persons engaged in farming, gardening or fruit growing, upon such conditions as are prescribed by the Minister, samples of the surplus of such products as are considered to be specially worthy of introduction;
- (d) analyze fertilizers, whether natural or artificial, and conduct experiments with such fertilizers, in order to test their comparative value as applied to crops of different kinds;
- (e) examine into the composition and digestibility of foods for domestic animals;
- (f) conduct experiments in the planting of trees for timber and for shelter;
- (g) examine into the diseases to which cultivated plants and trees are subject, and also into the ravages of destructive insects, and ascertain and test the most useful preventives and remedies to be used in each case;
- (h) investigate the diseases to which domestic animals are subject;
- (i) ascertain the vitality and purity of agricultural seeds; and
- (j) conduct any other experiments and researches bearing upon the agricultural industry of Canada that are approved by the Minister.

R.S., c. 61, s. 9.

Although the scientific program of the Department today is far deeper and broader than could have been envisaged by Canada's legislators in 1886, this Act still provides an adequate legal base.

(4) The Canada Grain Act

Scientific activities carried out under the Board of Grain Commissioners are provided for in the Canada Grain Act, 1930 (Sections 8 and 22):

- 8. Provision may be made according to law for the appointment to act under the Board of ... a chief chemist ... and such ... scientific,

technical and professional advisers, clerks, and other officers and assistants as may be necessary for the carrying out of the duties of the Board

22. The Board shall maintain an efficient and adequately equipped laboratory for research work in relation to grain. 1930, c. 5, s. 22.

Under this Act, the Board developed a grain research laboratory capable of conducting basic research, applied research and elaborate quality-testing programs.

2.2.b. Organizational Policies

A number of 'science policies' have been evolved, over the past century. These have been concerned with defining the role of the Department vis-à-vis other federal agencies, the provinces, the universities and industry; with balance and priorities in the research program; and with the problems of maintaining a vital research organization.

It is the policy of the Department:^{6/}

To keep its scientific activities 'mission - or problem - oriented'. Pure research, or research solely for the discovery of new knowledge, is left to other agencies. However, much of the basic research carried on in the Department is distinguishable from pure research only in that it is part of a long-term program aimed at solving a recognized set of problems.

To conduct a broad program of research - basic, applied and developmental. This 'trilogy' is important to the solution of practical problems because the biological, physical, economic and social processes that characterize agriculture must be understood if solutions are to be proposed and action programs undertaken without producing unacceptable side-effects.

To carry out the bulk of the program as in-house research but to supplement it with extramural contracts. It is easier to keep a program relevant to its goals if the staffs engaged in basic and practical aspects are housed in a single establishment under a common director. On the other hand, it is impossible to maintain a staff sufficiently diversified in its capabilities to attack all problems.

^{6/} This statement is largely based upon previous policy statements by Dr. Robert Glen, many of which appear in the following paper. Agriculture: Greater Farm Efficiency With Managed Research, Dr. Robert Glen, Assistant Deputy Minister (Research), Canada Department of Agriculture, Science Forum, Vol. 1, No. 3, June 1968, p. 13. (Appendix 3).

To engage in scientific activities for the solution of the problems of the primary industry, i.e. farm problems. Although this focuses our efforts to some extent, many farm problems have their origins 'beyond the farm gate', and are often shared by other industries (both primary and secondary).

To undertake research for and cooperate with other federal government agencies, provincial government agencies and universities in research where the Department has a joint interest. While this policy may also extend to industry groups, it does not apply to private firms which, nevertheless, often benefit from the results of research undertaken on behalf of the farmer.

To reduce attention to local problems as soon as appropriate local agencies are able to assume responsibility for them and to increase attention to large scale, long-term problems of regional, national and international significance. This double emphasis would be facilitated by an accelerated rate of growth of research in universities, provincial departments and industries.

To provide leadership in the development of a balanced, coordinated program of agricultural science for Canada. This has been accomplished, to a creditable degree, through the Canadian Agricultural Services Coordinating Committee (CASSC), its associated sub-committees, and other means (see 2.1.b). In this instance, balance refers to the distribution of research resources between programs designed to preserve what we have and to develop what we haven't. A substantial part of any 'balanced' scientific program must be devoted to high-risk research.

2.2.c. Functions and Responsibilities

(1) General

The Department's "role in Canadian science is expressed in three areas of responsibility: as a performer of agricultural research, as a national coordinating instrument for agricultural science, and as a contributor to the growing art of research management and the development of national science policy."^{7/}

^{7/} Dr. Robert Glen, Agriculture: Greater Farm Efficiency with Managed Research, Science Forum, Vol. 1, No. 3, June 1968. p. 11. (Appendix 3).

(i) As a performer of agricultural research:- The Department's role as a performer of agricultural research has two main facets; first, it is responsible for conducting sufficient research to maintain effective regulatory, stabilization, assistance and rehabilitation functions; and second, it is responsible for ensuring that Canada has a research program adequate to maintain its agriculture as a healthy and progressive industry.

The regulatory, stabilization, assistance and rehabilitation functions are carried out under more than 30 statutes under the Minister of Agriculture. These statutes affect matters such as the licensing and testing of commercial fertilizers, feedstuffs, seeds and pest control products; prevention of the spread of contagious diseases of livestock, destructive insects, and other pests; provision of uniform standards and systems of grading and inspection of agricultural products entering commercial markets; promotion of agricultural production, rehabilitation, and development; and stabilization of prices and incomes. In an era of rapid technological, economic and social change, substantial research support is required to ensure that the statutes and their regulations are fair, efficient and progressive.

Since it was first created, the Department has addressed itself to the task of ensuring that Canada has an adequate or optimum research program and will continue to pursue this elusive target. Lacking precise tools for the measurement of adequacy, our responsibility - as we have seen it - is to make well-informed judgments of the requirements for research in each field, in each region, and in total; to assess the efforts of the universities, provinces, industry and other agencies; and then do our best to provide the difference. We will have more to say, later, about the methods that might be used to arrive at balanced judgments.

(ii) As a national coordinating instrument:- In April 1965, the Canadian Agricultural Services Coordinating Committee (CASCC) reached an informal agreement on "Present Responsibilities for Agricultural Research in Canada", as follows:

"All agencies engaged in agricultural research in Canada are at liberty to undertake any or all types of investigation falling within their competence. Any institution or department is, therefore, free to cover a range of work extending from pure science through oriented basic studies to the most practical kinds of experimentation and testing. The

need is for coordination of the total effort to ensure maximum benefits from the research and educational resources currently available ... The Canada Department of Agriculture is taking the initiative in ... seeking coordination of effort among the major agricultural research agencies to achieve this end ..."

The composition and functions of CASCC are described in Section 2.1.b.

(iii) As a contributor to national science policy and research management:-

The CDA responsibility for national science policy has been well described by Dr. Robert Glen, former Assistant-Deputy Minister (Research), as follows:

"The development of policy for Canadian science as a whole lies outside of the Department of Agriculture. But the cumulative relevant experience in the department is substantial. CDA might logically be expected to play a contributory role, to provide what it can of the stuff from which national science policy decisions are made."^{8/}

This is, of course, what our brief is about.

On the subject of research management, the Department also supports the statement by Dr. Robert Glen, that:

"Experience in agriculture strongly supports the thesis that research can and should be managed, particularly at the broad strategic levels. In point of fact, all scientific research is managed now; some more than other, some better than other. Management skills and techniques will likely develop faster in applied research organizations, especially in those with large operational programs where objectives are clearly defined, strategic and tactical levels readily discerned, and the multidisciplinary approach encouraged. But it seems inevitable that all science will eventually be managed much more closely than at present. A beginning has already been made in Canada by the formation of the high-level (non-operational) Science Council of Canada and the Science Secretariat. We are challenged to learn how to manage without diminishing that essential ingredient for success, the creative imagination of the individual."

In addition to introducing Management by Objectives (see Section 2.2.d.), serious consideration is now being given to program budgeting, cost-benefit analysis

^{8/} Dr. Robert Glen, Agriculture: Greater Farm Efficiency with Managed Research, Science Forum, Vol. 1, No. 3, June 1968. (Appendix 3).

and other techniques of strategic management. These are outlined and discussed in a recent paper prepared for the Canadian Agricultural Services Coordinating Committee (CASCC) by two senior officers of the Department.^{9/}

Among their recommendations were:

"That CASCC undertake to develop a systematic, comprehensive, and classified list of the practical objectives of Canadian Agricultural Research."

"That those preparing project outlines, applications for grants, etc., be requested to state not only the scientific objectives but also the practical objectives or implications of the proposed research; and that this request be included in the next CASCC Project Inventory."

"That CASCC obtain an agreement from one of the faculties of agriculture to undertake a study of the annual operation and maintenance costs for a professional in each of its major disciplinary areas."

"That CASCC advocate the establishment of a unit for preparation of cost-benefit analysis both in CDA and in at least one university."

"That CASCC request CDA Research Branch to apply the "CASCC Intuitive Experiment" as outlined in this report."

The CASCC Intuitive Experiment refers to a method of arriving at a tentative optimum distribution of resources at some future date, based on a formal "opinion poll" of agricultural scientists. This experiment is now being conducted by the Research Branch.

(2) In Relation to Other Agencies

Two basic problem areas underlie relations between the CDA and other agencies in carrying out their scientific functions and responsibilities:

- Jurisdictional problems arising out of the difficulty or impossibility of adequately defining terms in the statutes. These begin with the B.N.A. Act which gives both federal and provincial governments jurisdiction over agriculture, but does not define agriculture.

- Problems arising out of the interdependence of sectors of the economy. For example, the fact that farm problems often originate 'beyond the farm gate' leads us - legitimately - into areas that concern other agencies and, conversely, leads them into areas that concern us.

^{9/} Evaluation Procedures for the Strategic Management of Agricultural Research, J.A. Anderson and M.E. Andai, undated (about January 1968) unpublished. (Appendix 6).

These have led, on occasion, to considerable friction and much heat. But they have also led to important 'modi vivendi', an awesome array of coordinating committees, and many very productive relationships.

(i) Federal agencies: -

The National Research Council. Relations between the Department and the N.R.C. were frequently strained during the formative years of the Council, because of overlapping in legal jurisdiction and because the borderline between industrial and agricultural research is so difficult to define. One of these disagreements erupted in 1928:

"When Tory tried to change the NRC Act, ... Grisdale seized the occasion to protest vigorously against certain clauses ... which gave the Council power to deal with natural resources ... Grisdale had 'very serious objections' to the clause that gave NRC the right to improve conditions in agriculture.

None of the changes desired by ... Grisdale were actually made in the NRC Act. This Act continued to give the Council power (on paper) to deal with natural resources ... However ... the time was coming when the NRC would avoid any sort of laboratory work that could conceivably fall within the range of interest of a government department. When a few such items could not be avoided, the NRC sought thorough discussion and sincere agreement beforehand and, in effect, this became the operating policy, without regard to what the Act did or did not state."^{10/}

Since that time, a number of continuing 'associate' committees have been formed to coordinate research between the two agencies, for example:

- the Associate Committee on Animal Nutrition
- the Associate Committee on Agricultural and Forestry Aviation
- the Associate Committee on Plant Breeding
- the Associate Committee on Plant Diseases
- the Associate Committee on Grain Research
- the Industrial Research Assistance Committee.

These associate committees are usually made up of representatives from the NRC, the CDA, other interested departments and universities working in the field.

^{10/} Mel Thistle, The Inner Ring - The early history of the National Research Council of Canada, University of Toronto Press, 1966, p. 261-2. See also pp. 266, 325, 333, and 339.

The Rural Development Branch, Department of Forestry and Rural Development. The Agricultural Rehabilitation and Development Act, and its brother FRED, provide great potential for either cooperation or overlap with the Department of Agriculture. The ARDA act permits the Minister to authorize research and investigation:

- "For the purpose of assisting the development of income and employment opportunities in rural areas in Canada and the improvement of standards of living in those areas ..." (Section 3(2)).
- "... for the development and conservation of water supplies and for soil improvement and conservation ..." (Section 4(2)).

and both Acts specifically direct the Minister to "make use, wherever possible, of the services and facilities of other departments of the Government of Canada ...". Cooperation between the Rural Development Branch, and the research units of the CDA, has been extensive: the Research Branch has undertaken a great deal of work basic to the Canada Land Inventory, and the Economics Branch has conducted and taken part in a number of rural surveys designed to define problems in specific geographic areas. Formal liaison has been maintained between the agencies by liaison officers appointed by the CDA, and by the Deputy-Minister of Agriculture in his capacity as member of the FRED Advisory Board. However, in spite of this record, and concurrent with an increase in number of economists on the staff of the Rural Development Branch (both central and regional), cooperation between it and the CDA Economics Branch has declined seriously during the past few years. Staff of the Economics Branch in our regional offices continue to undertake projects for, and to consult with, their regional counterparts (mainly provincial and PFRA) but contact at headquarters leaves much to be desired. The recent shift of PFRA into a new department to strengthen its ties with other development agencies is likely to do nothing to strengthen this relationship.

The Atlantic Development Board. Both the CDA and the ADB are concerned with agricultural development in the Atlantic Provinces as part of a general development strategy. The CDA's Economics Branch has provided: resources to conduct joint studies of the potential for agriculture and advice based on its own research in the area.

The Department of Trade and Commerce. Economic research on trade problems is the concern of both the CDA and the Department of Trade and Commerce. While the latter exercises undisputed leadership in the field of trade policy

generally, it tends to leave to the CDA economic research that is specific to primary agricultural products. This department is represented on a number of interdepartmental committees on grain matters and is invariably represented on international delegations involved in trade negotiations affecting agriculture.

The Dominion Bureau of Statistics. The statutory power for collection of statistics rests with the D.B.S. Both agencies collect and publish agricultural statistics but the CDA confines itself to ad hoc surveys and to data that are by-products of its regulatory functions. Liaison is maintained by both standing and special committees, such as the interdepartmental Census of Agricultural Committee, and by personal contact.

The Department of Transport. Both the CDA and the DOT have closely related interests in studies of climate and weather. To permit equally close working relationships, the Meteorological Branch of DOT staffs a part of the Agrometeorology Section of the Plant Research Institute in the CDA Research Branch.

The Canadian Transport Commission. The CDA and the CTC have a concurrent interest in problems associated with the transportation of agricultural products in general and grain in particular. The CDA's Economics Branch is currently conducting several descriptive and analytical studies basic to the rationalization of the grain collection system in the prairie provinces. The CTC will be one of the main users of the results. Liaison is by personal contact rather than by a formal committee.

(ii) Industry:- Our first responsibility, as indicated in our statement on science policy, is to the primary industry - the farmer. Nevertheless, because of the interdependence between primary and secondary industry, much of our research and development is concerned with problems of manufacturing and distributing farm supplies and farm products. Although the first beneficiary of such scientific work is often secondary industry, the work is not undertaken unless there are prospects that farmers will benefit too. Sometimes 'the longest way round is the shortest way home'.

Into this category falls the whole program of our Food Research Institute; a major part of the program of the Marketing and Trade Services Division; nearly all of a large program of research, development and testing on pesticides, herbicides, fungicides, feeds and veterinary medicines; and a substantial part of our work on fertilizers and grain quality.

Since little agricultural research is conducted by Canadian agribusiness, it is heavily dependent on parent firms in the U.S.A., on government and on the universities. Research that is conducted by these firms is, with few exceptions, either highly applied or developmental, and is often confined to adapting a U.S. product to Canadian conditions or developing new formulations that will conform to Canadian law.

Some of our closest relationships are with the pest control products industry, as a result of our strict legislation in that field. An important function of the CDA in this area is to ascertain not only whether a product will do what is claimed for it but also to judge whether it will have deleterious effects not claimed for it (tolerance limits, hazards, and pollution). To carry out the first part of this function, the Department frequently carries out field tests at a number of locations; but to carry out the second part, we require a broad program of basic research aimed at obtaining an understanding of plant and animal life processes. As a result, the CDA maintains close liaison with both industry and the universities, both of which have an influence on our research program through working parties such as the National Committee on Pesticide Use in Agriculture.

The CDA makes no research grants to industrial firms but it does provide a consultative service to the NRC (and, incidentally, to industry) in its Industrial Assistance Grants program. For example, when the NRC receives from an industrial firm a proposal to do research in a field that is within the CDA's competence, the latter appoints - on request - a liaison officer to advise the NRC on approving a grant and to assist it in monitoring the research project. The firm undertakes the research to improve its prospects of profit; the NRC provides financial support to promote Canadian industry; and the CDA provides scientific advice in the interest of the farmer.

(iii) Educational Institutions:- The CDA has no responsibility for education, nor any function in the field of formal education, yet it maintains close relations with the universities in its role

- as a prospective employer of students of agriculture and related sciences,
- as an employer of university staff on contract,
- as a provider of grants for extramural research projects,
- as collaborator on joint scientific projects,
- as a coordinator of agricultural research in Canada.

Four of our major research establishments are situated at universities that have agricultural faculties and conduct agricultural research (Laval University, University of Manitoba, University of Saskatchewan, and the University of B.C.) and in a number of other instances our research establishments are located on campus, in the same city, or close by.

<u>University</u>	<u>Station</u>
Memorial University	- St. John's W.
St. Dunstons University	- Charlottetown
Acadia University	- Kentville
University of New Brunswick	- Fredericton
Windsor University	- Harrow
University of Western Ontario	- London
Brock University	- Vineland
Carleton University	- Ottawa
Ottawa University	- Ottawa
Queens University	- Belleville
Lethbridge University	- Lethbridge
Simon Fraser University	- Vancouver
Victoria University	- Saanichton

The CDA encourages its scientists to serve as part-time lecturers and instructors in agricultural and other science faculties and they frequently do so. In 1966-67, CDA staff from 34 establishments contributed to the programs of 21 Canadian and 16 foreign universities by giving 721 hours of lectures and supervising 487 hours of laboratory instruction.

As an employer of scientists the Department is responsible for transmitting, to the universities, forecasts of its future needs for scientific staff in both quantitative and qualitative terms. This is done both on a personal basis, through CASC (see Section 2.1.b.) and through the Public Service Commission.

University staff members are sometimes employed on contract to provide expertise, on a short-term basis, that is not available within the Department (see Section 2.7.a.4).

We also make use of university expertise through our extra-mural research program. This program is based partly on the philosophy that the Department should help to support university research as a necessary adjunct to a good educational program (see Section 2.7.a.5).

A third means of using university expertise is to arrange for departmental staff to carry on research projects under the supervision of university staff. This is also done in reverse relationship; in 1966-67 CDA laboratories were used by 68 graduate students working for graduate degrees, 49 under the direction of CDA personnel.

CDA staff took part in 112 cooperative projects and served on 91 university committees in 1966-67. The Canadian Soil Survey is an excellent example of a long-term cooperative program. It is carried out under the joint auspices of the CDA Research Branch, the universities and departments of agriculture in each province - under the guidance of the National Committee on Soil Surveys (under CASCC).

In its role as coordinator of agricultural research in Canada, the CDA respects the right of each university to conduct any research within its competence (and vice versa) yet the two may (and do) influence each others research and development programs through agreement within each of seven national committees under CASCC.

It is of interest to note that a considerable number of faculty members of both Canadian and U.S. universities were recruited from CDA research units. Their former affiliation with the Department facilitates cooperative arrangements and continued interest in CDA research. A list of faculty members now on the staffs of Canadian universities who were formerly employed by CDA is given in Table 2.8.6. It is unfortunate that a similar list for U.S. universities could not be prepared.

(iv) Monitoring Scientific Activities Outside of Canada:- The CDA has no direct scientific representation abroad and very little responsibility for monitoring foreign scientific activities on behalf of others. However, as a performer of research it has a substantial monitoring function which is carried out:

- by exchanging publications with foreign scientific organizations on a formal basis,
- by subscribing to foreign scientific journals,
- by supporting international agencies with scientific programs,
- by making use of the NRC's scientific liaison officers and the Department of Trade and Commerce's trade commissioner service,
- by attending international conferences,
- by international visits.

Some of these are described in other sections of this report.

In 1967-68 our Library received scientific publications from some 2,200 organizations in 108 countries, as part of a formal exchange program. This program provides about 85 per cent of its annual acquisitions. It purchased about 1460 foreign periodicals (titles) from roughly the same number of countries, about 98 per cent of which were scientific. And it bought \$62 thousand worth of books, of which at least 90 per cent were both foreign and scientific. Most of these were obtained in the U.S. and Europe but a substantial number originated in Asian and 'Communist bloc' countries including Mainland China.

We monitor through international organizations such as the Commonwealth Agricultural Bureaux (CAB), the Organization for Economic Coordination and Development (OECD), and the Food and Agriculture Organization (FAO) which report on scientific activities in their own organizations and throughout most of the world.

Foreign representatives of the National Research Council (in three locations) and the Department of Trade and Commerce provide information to the Department both voluntarily and on request.

Our only responsibility for monitoring on behalf of others arises out of our membership in and contributions to the CAB which provides an excellent abstracting service (see Section 2.8.5).

(v) Provincial Government Agencies:- Since jurisdiction over agriculture is shared by federal and provincial governments, and since jurisdiction over scientific activities is not mentioned in the B.N.A. Act at all, there would appear to be a tremendous field for duplication and conflict.

An excellent history of this problem and its remedies, up to 1945, may be found in Agriculture - Reference Book for Dominion-Provincial Conference on Reconstruction^{11/}, to which we have already referred. According to this account, complaints of intrusion and duplication were most prevalent just before the first world war and during the 1920's, and that this eventually led - in the early 1930's - to the formation of the "National Committee on Agricultural Services composed of the Dominion and Provincial Ministers of Agriculture and an Advisory Committee of technical agriculturists representative of all the services, Dominion and provincial, engaged in scientific

^{11/} Part I, General Review, pp. 7-25.,

agriculture". This was the progenitor of CASCC (described in Section 2.1.b.) under which nearly all formal coordination of federal, provincial and university research takes place.

(vi) The Agricultural Economics Research Council:- The terms of reference of the AERC, an independent research agency, provide ample opportunity for duplication or coordination of program with the Economics Branch of the CDA. The Council was established in 1962

"...to strengthen the agricultural industry in Canada by the development of a long-range independent research program in the sciences of agricultural economics and rural sociology".^{12/}

and adopted the following aims:

- to conduct research basic to long-term decisions in agricultural policy;
- to increase research in the social sciences through a system of grants and contracted projects;
- to increase pure, basic-applied and statistical research in agricultural economics and rural sociology;
- to coordinate research in agricultural economics and rural sociology across Canada.

Financial starvation has prevented the Council achieving all of its aims, notably the formal coordinating role, or - for that matter - any one of them to the extent originally envisaged. The total annual budget has been only \$150,000 contributed by the federal government (through the CDA), provincial governments, agri-business, and farm organizations.

Although both the AERC and the Economics Branch are concerned with research basic to policy-making, there has been little conflict in program for a number of reasons:

- the Economics Branch tends to confine itself to research basic to federal policy-making, while the AERC's field is broader;
- the Economics Branch projects have tended to be 'ad hoc' and the results confidential; the AERC's have tended to be long-term and the results published;

^{12/} Agricultural Economics Research Council.

- the universe of potential research projects is so much larger than the resources available that the chances of conflict are small;
- extra-mural research proposals received by the CDA are submitted to the AERC for comment if they have economic or sociological content;
- representatives of both the CDA and the AERC are appointed to the National Farm Management Committee under CASCG;
- representatives of the CDA sit on the AERC's governing body.

The last - but not necessarily least important - reason is that the 'society' of agricultural economists and rural sociologists is so small that much coordination is accomplished on a personal basis.

(vii) Representation on Delegations and Coordinating Committees
by CDA Staff, 1967-68: -

This is an incomplete list. All sections - especially the list of regional committees - could be greatly expanded. Staff memberships in professional associations have been excluded.

(1) International Delegations and Committees

- GATT Tariff Negotiations on Cereals
- International Grains Conference
- Meeting of the Wheat Exporting Countries
- International Wheat Council
- "Kennedy Round" Trade Negotiations
- 11th Session of the FAO Study Group on Grains
- FAO Council
- FAO Committee on Commodity Problems
- FAO Committee of Commodity Policy
- World Food Program
- Canada-U.S. Committee on Trade and Economic Affairs
 - Sub-committee on Techniques
 - Sub-committee on Penalties
- GATT - 24th Session
- GATT - Committee on Agriculture
- GATT - Working Party on Dairy Products
- Canada-U.S. Committee on Marketing
- U.S. Outlook Conference 1967

OECD - Committee for Agriculture
 OECD - Expert Group on Interdisciplinary Research
 International Conference of Agricultural Economists
 International Sugar Conference
 F.A.O. Committee on Pesticide Use in Agriculture
 F.A.O. Working Party on Pesticide Residues
 W.H.O. Expert Advisory Panel on Insecticides
 International Union of Pure and Applied Chemistry
 - Pesticide Section
 - Applied Chemistry Division
 - Commission on Chemical Nature of Terminal Residues
 - Commission on Methods of Pesticide Residue Analysis
 F.A.O./W.H.O. International Committee on Codex
 Alimentarius - Pesticide Residues
 F.A.O./W.H.O. Expert Joint Meeting on Pesticide Residues
 F.A.O./W.H.O. Working Party on Pest Resistance to Pesticides
 O.E.C.D. Committee on Research Policies for Pesticides in the,
 Environment
 International Crop Improvement Association
 International Spring Wheat Trials, Rockefeller Foundation
 International Cereal Trials (U.S.A.)
 European Brewery Convention Trials
 International Cereal Winter Nursery and Breeding
 Material Increase, Research Station, Brawley, California
 International Cereal Rust Nursery, U.S.D.A., Puerto Rico and Florida
 International Corn Trials, Indiana, U.S.A.
 International Sunflower Trials, Chile
 International Wheat Genetics Symposia
 International Barley Genetics Symposia
 International Oat Work-Planning Meetings
 U.S. Flax Research Institute Meetings
 International Biological Program
 International Committee on Irrigation and Drainage

International Seed Testing Association
 International Commission for Horticultural Engineering
 International Commission on Zoological Nomenclature
 International Congresses of Plant Pathology, Genetics, Entomology,
 Horticulture, Soil Science, Nutrition, Physiology,
 Agr. Engineering, Animal Reproduction, Animal Husbandry, etc.
 F.A.O. World Association of Animal Production
 F.A.O. World Soil Map
 F.A.O. Expert Committee on Integrated Pest Control
 International Hydrological Decade
 Office International des Epizootics
 Bureau of Animal Health

(2) National and Regional Committees

AERC Coordination Committee on CANFARM Project
 The National Farm Management Committee
 Maritime Farm Management Committee
 Alberta Agricultural Coordinating Sub-Committee on Economics
 Saskatchewan Farm Management Coordinating Committee
 Joint Policy Board, ARDA, for Study of Saskatchewan Census Division
 No. 16 by the Centre for Community Studies
 B.C.D.A. Farm Management Committee
 Social Sciences Lead Committee (B.C.)
 Present Land Use and Socio-Economic Committee (B.C.)
 Animal Science Lead Committee (B.C.)
 Farm Safety Steering Committee, National Safety League of Canada
 Federal-Provincial Agricultural Manpower Conference
 National Committee on Research for Co-operatives
 National Health Pesticides Committee
 Canadian Animal Breeders Committee
 Conference of Canadian Workers in Animal Pathology

Special Committee

Canadian Poultry Disease Conference
 Canadian Poultry Conference
 National Swine Breeding Committee
 Research Committee on Beef Quality and Grading
 Associate Committee on Animal Nutrition
 Associate Committee on Agricultural and Forestry Aviation
 National Committee on Pesticide Use in Agriculture
 Canadian Council of Resource Ministers, Intergovernmental Advisory
 Committee on Pollution of our Environment
 Canadian Forage Seed Project
 Associate Committee on Plant Breeding
 Associate Committee on Plant Diseases
 Associate Committee on Grain Research
 National Weed Committee
 National Committee on Agrometeorology
 National Committee on Agricultural Engineering
 National Committee on Soil Fertility
 National Committee on Soil Surveys
 National Committee on Animal Breeding
 Canadian Agricultural Services Coordinating Committee
 Canadian Horticultural Council
 Ontario Vegetable Research Committee
 Canadian Standards Association Committee on Safe Methods for the
 Dissemination of Pesticides

(3) Interdepartmental Committees

Interdepartmental World Food Program Committee
 Canadian Interdepartmental FAO Committee
 Interdepartmental Committee on I.L.O. activities
 Census of Agriculture Committee
 Agricultural Outlook Committee
 Privy Council Committee on Socio-Economic Research
 Interdepartmental Committee on External Aid
 Interdepartmental Committee on OECD Agriculture
 Special Committee on Anti-Dumping Legislation
 Interdepartmental Committee on Specialized Agencies

1971 Census of Agriculture Schedule sub-committees
 Special Advisory Committee on Grain Grading and Handling
 Interdepartmental Committee on Grain Policy
 Interdepartmental Committee on Grain Elevator Ownership
 Artificial Insemination of Cattle Advisory Committee
 Poultry Industry Committee
 Federal Interdepartmental Committee on Pesticides
 Canadian Interdepartmental Committee on Codex Alimentarius
 National Advisory Committee on Water Resources Research
 Interdepartmental Committee on Forest Spraying
 Committee on Wheat Problems (Depts. of Agr. and Trade and Commerce)
 Defence Research Board Advisory Committee on Entomological Research
 Defence Research Board Advisory Committee on Biological Warfare Res.
 Federal Interdepartmental Committee on Pesticides
 Interdepartmental Committee (Agr. and Forestry) on Taxonomy and
 Parasite Importations

Industrial Research Assistance Committee (N.R.C. - Agriculture)

2.2.d. Review of Effectiveness, Duties and Goals

Since World War II, when the responsibility for directing Canada's agricultural war effort was centralized in the CDA, responsibility for setting broad national goals and for assessing accomplishment has been vested in CASCC and its sub-committees. To supplement the work of CASCC, the federal government - with the concurrence of the provinces - appointed an Agricultural Task Force under the Inquiries Act in 1967, and gave it six objectives of which the following three are most pertinent:

- to determine and assess the farm problems confronting Canada ...;
- to examine and assess the long-term goals of agriculture and agricultural policy ...;
- to assess in detail various Canadian policies in regard to credit, research, extension, education, prices and trade.

The results of its deliberations are expected early in 1969.

Along with this examination of Canadian agricultural goals and policies, the CDA launched a complete review of its own aims and objectives last year by adopting an approach called Management by Objectives. Essentially, this is an attempt to articulate the aims, objectives and goals of the Department and each of its components, to plan and control activities to achieve them, and

then to measure the degree of success. (In concept, it is similar to 'program budgeting' which is currently being introduced into the federal service by the Treasury Board.) Once the first 'round' of goal-setting is completed at all levels, it is intended that the process will become one of continual review and revision in association with the annual Program Review.

We do not mean to imply, in the preceding paragraph, that the CDA has been operating without goals, reviews and measures of effectiveness. Annual competition for men, money and materials has made such reviews mandatory at every level, but the judgements made under the 'old' system have been more subjective than those we expect to make in the future.

In the Grain Research Laboratory, there has been a series of four Review Committees appointed by the National Research Council at the request of the Board of Grain Commissioners. In addition, there are reviews of work and policy at meetings of directors of research in other branches of the Department. Finally, there is a continuing internal study and review of the work by senior officers of the unit and the BGC.

The goals and program of the Library are under constant review by a Library Committee composed of the Chief Librarian and senior officers of the various branches served. Each branch library gets similar guidance from representatives of local 'user' agencies.

Review procedures in the three remaining units are similar but not identical with one another. Generally speaking, top management distils a sense of direction from the current and potential problems of agriculture as enunciated by governments, universities, farm organizations, agri-business, and the 'agricultural community'. This direction is usually discussed, in general terms, with lower levels of management and research staff at work-planning meetings. Projects are then developed by research staff, proposed to management, and matched - by management - against the gaps in knowledge revealed by the problems to be solved. Those that meet the requirements are approved, initiated and monitored by senior officers of the units concerned (see 2.7.1 and 2.7.2).

2.2.e. Outside Studies to Improve Operating Procedures

Three 'outside' studies have been commissioned during the past five years:

- Price Waterhouse and Co. Ltd. in 1963-64 conducted a 6-month financial management study to test the feasibility and propose means of implementing Glassco Commission recommendations on financial management. Following this study, fundamental changes in program evaluation, resource allocation reporting, accounting and auditing procedures have been introduced in the interest of improved management of research activities. Approved by T.B. 618341 of November 21, 1963 - \$118,000.
- Peat, Marwick, Mitchell and Co. in 1966 conducted comprehensive study to identify and assess the data processing and computational requirements of the Department for the next five years and to recommend the appropriate computer system, data processing facilities, staffing and services to meet these requirements. Subsequent acquisition of computer hardware have substantially improved the Department's capability in scientific analysis. Study approved by T.B. 658559 April 21, 1966 - \$35,000.
- Agriculture Task Force. An Economic Task Force engaged in 1967 is now assessing many aspects of Canadian Agriculture including research, but with particular emphasis on farm income and productivity, with the objective of projecting national agricultural goals and recommending policies to meet them. The project, originally approved with a budget of \$688,000 will continue into 1969 and incur an estimated total expenditure of \$900,000.

In addition, a number of studies have been made by the CDA's own management consulting group: Management Services, Financial Administration Branch. It provides analytical and advisory services and assists in implementing management improvement policies in all areas of administrative work. The Division is staffed by specialists and general management analysts who conduct studies and make recommendations on a wide variety of problems affecting matters such as organization, work measurement, electronic data processing, financial and other systems, forms control and design, records management, communications and office layout.

2.2.f. Responsibilities and Powers in Relation to Activities and Programs

Since our statutory powers are broad and our responsibility, as we see it, is to ensure that Canada has a well coordinated and well managed research program adequate to maintain its agriculture as a healthy and progressive industry, any comment on this relationship may be, in effect, a comment on the inadequacies of our program.

Various measures of adequacy can be used:

- our degree of success in maintaining a healthy and progressive industry, assuming that this is possible through the application of science;
- the nature, number and magnitude of persistent unsolved farm problems, again assuming that they can be solved by the application of science;
- the extent to which an increase in research resources would 'pay off' in benefits to farmers and the nation;
- the extent to which improved management of existing resources would provide greater total 'pay off'.

Canada agriculture is unquestionably progressive, but not progressive enough. According to the Economic Council of Canada

"(The) ... rate of increase of labour productivity in agriculture over the past two decades has been considerably greater than in other sectors of the economy. However, average farm incomes have remained significantly lower than average nonfarm incomes. There are two basic reasons for this persistent disparity. First, given the initial wide gap between the levels of average farm incomes and average nonfarm incomes in the early post-war period, a substantially faster rate of income-generating productivity growth is required in agriculture, merely to prevent a widening of this disparity. For example, on the assumption that the average level of productivity in agriculture is only half of that in the rest of the economy (an assumption which, on the basis of available information, is roughly in line with the actual situation), it would require a rate of productivity growth of $4\frac{1}{2}$ per cent per year in agriculture to prevent, over a 20-year period, a widening absolute disparity, with the rest of the economy growing at a rate of only $2\frac{1}{2}$ per cent per year."^{13/}

^{13/}

The Challenge of Growth and Change, Fifth Annual Review of the Economic Council of Canada, September 1968, pp. 82-83.

Until these gaps in productivity and income are closed, we must conclude that agriculture can not be pronounced healthy and that our scientific program may be wanting either quantitatively, qualitatively, or both.

Although we have made tremendous progress, especially in the technology of production and quality control, agriculture faces a host of serious, persistent and costly problems associated with

- long-term changes in demand for agricultural products;
- income instability owing to weather, pests and diseases, and short-run changes in demand and supply;
- rapid changes in industrial technology;
- rural education and farm management.

Let us take a case in point. During the past 10 years, income and price stabilization programs undertaken by this Department have cost Government \$527 million of which almost \$400 million has gone into the dairy industry alone.^{14/} These are greater than our total expenditure on R & D during the same period. We can not say with certainty that these expenditures would have been avoided and our R & D effort been either greater or distributed differently, but we do believe that much more effort should be directed toward foreseeing such problems, understanding their basic causes and designing policies to promote quicker shifts to alternative production programs on the farm.

If we adopt the 'pay off' concept as a criterion of adequacy, we can fairly claim that very large increments of investment in agricultural R & D would be required before they would begin to exceed the resulting incremental benefits. However, since resources are limited, the fundamental question for science policy-makers is how to obtain the largest aggregate return for each additional research dollar. This problem, which is a problem of research management, is one of the most important we are now trying to solve.

2.2.g. Major Hindrances to Effective Performance

(i) The B.N.A. Act:- In outlining the role of the CDA, we have taken care to explain the machinery of peace-time cooperation between federal and provincial jurisdictions and to note that the machinery is performing effectively. Yet we would be less than candid if we did not also admit that the

^{14/} During the period April 1958 to March 1967. Source: Annual Report of the Agricultural Stabilization Board, 1966-67.

current federal system is a ponderous one, making a concerted, coordinated attack on most agricultural problems extremely difficult.^{15/} Since the provinces share responsibility for agriculture and have full responsibility for both education and intra-provincial trade, active provincial cooperation is required before the CDA can achieve most of its aims.

(ii) Terms of Reference:- In a preceding section we have indicated the extent of actual and potential cooperation among federal departments and agencies with inter-related responsibilities. We believe that cooperation could be improved by clearer definitions of the roles of the CDA and other federal departments and agencies whose programs directly affect agriculture.

(iii) Service Work:- In some of the research units, the pressure of ad hoc investigations, service work and extension activities seriously interferes with research. As this type of work usually rates high priority, research tends to be a start-stop operation which is not conducive to output. The net result is that, in some units, fundamental studies are often put aside indefinitely even though they are likely to have greater impact on the agricultural economy. In other words, there is too little correlation between the important and the urgent. For example, the Glassco Commission commented on the situation in the Economic Branch as follows:

"In the Department of Agriculture, with the largest economic analysis organization in the government, the pressure of ad hoc projects is so great that virtually no economic research is done, although the agriculture economy has undergone profound change in recent times and a fundamental understanding of the process is absolutely vital."^{16/}

While this is an over-statement of the problem, it is nevertheless accurate in principle. Unfortunately, there has been no appreciable improvement in the situation since that time.

^{15/} "... in order ... (to) truly grasp the tremendous scope of federal-provincial relationships, I will add that in 1950, at the request of the Privy Council Office, I made a summary of existing federal-provincial co-operative arrangements which covered more than fifty pages." Pierre Elliot Trudeau, Federalism and the French Canadians, 1968, footnote to page 136.

^{16/} Royal Commission on Government Organization, 1962, Vol. 3, p. 27.

(iv) Shortage of Trained Staff:- There are inadequate training opportunities at Ph.D. level in Canadian universities in specialized fields: pesticide chemistry, natural products chemistry, soil chemistry, soil micro-biology and agricultural economics. The shortage of agricultural economists is especially critical.

"The principal factor limiting the role of economists in agricultural research is the availability of well trained agricultural economists. For interdisciplinary research programs where new ground is still to be broken and disciplinary biases overcome, it is essential that the pioneering economists be well trained in their own discipline and have a healthy respect for those other disciplines with which they are collaborating. The increased demand for agricultural economists is being reflected in an increasing proportion of graduates of agricultural colleges at the bachelor's level selecting agricultural economics as their career. In the United States, where most Canadians still go for a Ph.D. degree in agricultural economics, the number of Ph.D.'s. graduated in this field has more than tripled since 1938-39. In spite of this continuing increase in the number of Ph.D.'s. in agricultural economics being turned out by U.S. universities, there is probably a keener competition for trained agricultural economists today than for any other professional specialty. The shortage of trained agricultural economists is, therefore, the crucial factor which sets definite limits to the over-all contribution which agricultural economists can make to agricultural research".^{17/}

Factors other than supply shortage also affect our ability to attract high quality scientists. Insufficient financial reward and prospects of advancement are discouraging to scientists in government employ. Complex and restrictive administrative regulations in government procedures detract from the freedom and prestige that scientists expect and receive in the university environment. Although new laboratory buildings are being provided, many of our research establishments are still housed in antiquated and crowded quarters. Professional recruits, newly-trained in the use of modern, sophisticated instrumentation at the university, are expected to conduct effective research with out-dated equipment, and the quality and efficiency of their research suffers.

^{17/} Extract from The Role of Economists in Agricultural Research, Dr. S.C. Hudson, Director-General, Economics Branch, Canada Department of Agriculture, a paper presented to a seminar of the Agricultural Research Study Group, Science Secretariat, March 6, 1967.

Many small laboratories, established to cope with the numerous local and regional problems, have resulted in the scientific and social isolation of staff. Inadequate scientific conference attendance funds do not permit compensation for scientific isolation. No compensation for increased local cost of living or schooling is permissible. All these difficulties contribute to the disenchantment of our staff members and are reflected in the large turn-over of our most effective and most promising scientists.

(v) Staff Immobility:- Insufficient compensation for financial losses associated with transfer impedes the movement of staff required to meet the needs of program changes. Local political pressures frequently obstruct the geographic relocation of staff and facilities required for operational efficiency and priorities of program.

(vi) Budgetary Fluctuations:- Long range planning and assurance of continuing support are essential to effective research. In a department where fixed legislative and regulatory responsibility must take precedence over research, the annual budgetary fluctuations imposed by governmental fiscal policy is usually absorbed by adjustment of research expenditures.

2.2.h. Changes in Organizational Functions

No major reorganization of the Department is in prospect. During the last reorganization, in 1959, the Research Branch decentralized its organization and consolidated many establishments to provide a better interdisciplinary approach. The organization of the Economics Branch has been the subject of a recent study by the Organization Division of the Public Service Commission. The report has been received by the Department, and, although no final decisions have been made yet, some of the following changes in emphasis will apply to it as well as to other units involved in research.

(i) Interdisciplinary Research:- Emphasis on interdisciplinary research will be increased through the adoption of an inter-branch team approach to the measurement and solution of agricultural problems.

"There has ... been a lag in the integration of research projects on an interdisciplinary basis between technical scientists and economists. In recent years much greater interest in interdisciplinary research with the economist has been expressed by the technical scientist ...

"The current needs, and those of the future, call for continuation of this trend toward closer collaboration in depth involving the joint

design and carrying out of research projects. Such collaboration will involve the economist in work in the laboratory and the technical scientist in surveys on farms and in the economist's production functions and econometric models in a joint search for solutions to farm problems. It will also involve the economist in interpreting and in selling the results of agricultural research to farmers based on the impact of that research on net farm income."^{18/}

(ii) Program Evaluation:- In line with the current emphasis on management improvement through Management by Objectives, Program Budgeting and other tools, it is likely that a 'program analysis' unit will be established to develop techniques and procedures for applying cost-benefit analysis to departmental policy programs and the allocation of research funds. Subsequently there will be a requirement for evaluating programs and activities. This type of work has been started by the Economics Branch but no final decision on location of such a unit has been made.

(iii) Consolidation of Establishments:- The current policy of consolidating the small, isolated, poorly-equipped research stations into larger units will continue as provincial governments and universities take over research on local problems.

(iv) Research in Quebec:- The program of research in Quebec will be expanded as rapidly as possible, taking into account the initial shortage of French-speaking scientists. According to Philippe Garigue,

"Il existe un décalage extrêmement important dans les pourcentages: si les Canadiens-français sont près de 30% de la population totale du Canada, ils sont moins de 10% de la communauté scientifique canadienne."^{19/}

Now that the CDA has initiated the establishment of a major research station at Laval University, there are prospects of correcting this imbalance (in agricultural R and D) by close collaboration between station and university and through CDA's extra-mural research program.

(v) Relations with Universities:- We envisage closer working relationships through CASCC with universities across Canada. More emphasis

^{18/} Extract from The Role of Economists in Agricultural Research, S.C. Hudson, formerly Director-General, Economics Branch, C.D.A.

^{19/} Philippe Garigue, La Recherche au Québec et le Problème Constitutionnel, Science Forum, Volume 1, Number 2, April 1968, p. 18.

will be placed on joint research projects, especially basic research, not only as a means of using existing expertise in the universities but also to bolster the training of student scientists.

(vi) Animal Research:- We envisage some redistribution of R and D effort in favour of the animal sciences. Both the Glasco Commission and the Economic Council of Canada have suggested that this area of research needs more attention.

(vii) Farm Management:- The CDA plans a substantial step-up in research, development and assistance in farm management.

(viii) External Aid:- In accordance with government policy, the CDA plans to expand its assistance to the "developing" countries by offering more opportunities for on-the-job scientific training, and by lending more scientists for technical assistance missions. It seems likely that there will also be some changes in the character of such assistance, for example, lending teams of scientists may increasingly replace lending of individuals and consideration is being given to the team approach in temporarily staffing schools of agriculture in the universities.

2.3. Personnel Policies

2.3.a. University Recruitment

Initial contact with prospective recruits for research positions is usually achieved by one of the following means:

1. Employment of university undergraduate or postgraduate students as summer student assistants under the Career Introduction Program.
2. Employment of students by faculty members under CDA Operating Grants or Extramural Research Contracts.
3. Personal contact with university faculty members.
4. Personal contact between CDA scientists and university students at meetings, conferences, or seminars, or during visits to the university.
5. Unsolicited inquiries or applications to staff scientists, to the Branch, Department or Public Service Commission.
6. University recruitment by the Public Service Commission by advertisement in Canada and abroad.
7. University recruitment by teams organized by the Public Service Commission and including staff members of CDA Personnel Branch and scientists of CDA research units. These teams visit universities in Canada, U.S.A., and Europe, make known our staff requirements and opportunities, and interview and evaluate potential recruits. During these operations, close liaison is maintained with other government departments with similar professional requirements.

University recruitment, at the highly specialized level with which we are concerned, is sophisticated and competitive. Special problems arise when direct competition with industry is involved in fields where there is a shortage of qualified specialists. Another special problem is posed by the need to recruit bilingual scientists, preferably Canadians, who can only be located at one or two universities. The staffing of research stations in rural areas is often difficult.

2.3.b. Criteria for Prediction of Research Ability

No unique criteria have been developed to help identify those who will become creative and effective researchers. Initially, the personal assessment of the faculty head or scientist under whom graduate research was conducted is obtained. This evaluation will be weighed by the reputation of the supervising

faculty member which is reflected in the calibre of his students. The grades obtained by the student and the quality of the thesis research, as well as references from other qualified scientists, are examined. Subsequent employment on a probationary basis for one year or longer permits a first-hand assessment of the new employee. Finally, annual appraisal of every scientist is carried out for purposes of merit increase and is based upon the quantity and quality of research productivity during the year. This appraisal is made at all levels, from the immediate supervisor, section head, station director, research coordinator and executive committee.

2.3.c. Potential as Research Administrators

It is difficult to apply the necessary criteria for administrators to productive scientists. Productivity in a research scientist is a fair measure for professional appraisal but does not necessarily provide an indication of administrative potential. On the contrary, the introspective character of the research activity probably attracts individuals less inclined to the gregarious demands of the managerial function. Outstanding research and administrative competence is a rare combination.

It is possible to assess the administrative potential of research personnel only by their performance in progressively higher administrative positions and this has been the procedure adopted. During the course of this progression every opportunity is provided for administrative training intramurally and through formal courses made available by the Public Service Commission or special courses at universities. Occasionally it has been possible to utilize an administrative vacancy as a test situation by making an acting appointment.

2.3.d. Research Administrator vs. Research Scientist

The promotional system is the same in principle for both Research Managers and Research Scientists. Departmental and Interdepartmental committees annually appraise performance on which to grant merit increases but different criteria must obviously be applied; for the Research Manager, general performance is taken into account, for the Research Scientist productivity measured in terms of research publication is the paramount factor.

For the Research Manager or Administrator the level of his grade is fixed by point rating relative to the responsibilities of the position. His advancement within the grade is determined by annual evaluation of his performance. To advance to a higher grade, he must move to a position of higher responsibility.

For the Research Scientist advancement within a grade is based on annual assessment of his research productivity and between grades on his accumulated scientific contribution and status in the scientific community. In other words there are no barriers to steady progression through the Research Scientist grades.

Salaries of the two groups are as follows:

Research Manager, Grade 1: \$11,034 to \$18,000

2: \$15,999 to \$20,900

3: \$18,757 to \$24,100

Research Scientist 1: \$10,200 to \$11,249

2: \$11,034 to \$16,999

3: \$15,999 to \$19,747

4: \$18,757 to \$22,757

2.3.e. Intramural and Extramural Education and Training for Research Scientists and Administrators.

The following programs are available in this context for Scientific and Managerial training. In addition, 10-15 postdoctoral transfers are granted each year, with travel expenses paid by the Department.

1. Managerial and Supervisory Programs

Career Assignment Program (C.A.P.)

Departmental Executive Development Program

Management Development Program (P.S.C.)

Departmental Management Information Programs

Management Improvement Courses (P.S.C.)

Language Training and Bicultural Program (P.S.C.)

Outside Seminars

In-House Conferences

Data Processing Courses

P.S.C. Specialized Courses

Departmental Program, General

2. Training and Development Policies

(1) Educational Leave - Professional Staff

This is a program to provide academic training, full time, to carefully selected officers so that the Department can meet special manpower requirements that cannot be met by recruitment from outside the Public Service.

Special Committee

Nearly 30 C.D.A. officers will attend university in 1968-69 under this program and will receive financial support varying from a half-pay allowance to three-quarters pay allowance to full-pay allowance. Tuition and transportation costs of participants are also paid.

Educational leave without pay is occasionally granted to an employee who has given about average service to the Department and who wishes to undertake academic training.

(2) Educational Leave - Non-Professional Staff*

In addition, arrangements exist for the granting of educational leave for non-professional staff, as well as partial reimbursement of tuition for members of the Branch who successfully complete evening or correspondence courses (T.B. Minutes 620135 and 620135-1).

*Non-professional may be broadly defined as employees who do not have university degrees.

(3) Time Off Duty for Academic Training

A departmental program provides managers with a vehicle for training of employees to meet special operating needs. Managers may apply for authorization to allow an employee to take up to eight (8) hours of training a week during normal hours of work.

The employee remains "on duty" and receives full pay, but cost of tuition, books, or transportation is not paid for by the Department.

This program has proven useful in providing employees with special technical knowledge and skills.

(4) Conference Attendance

Though conference attendance is not usually considered a training or development activity, it is included in this summary of programs because conferences among other things do contribute to employee education and is so considered by Treasury Board.

The Department in 1968-69 will spend over \$200,000 (See Section 2.8.4.) on conference attendance (travel, subsistence and registration costs only). Conference policy is dictated by Branch needs and conference attendance policy is developed by Branches subject to the Deputy Minister's approval.

Conference attendance is seen as a vehicle for the up-dating of knowledge, the development of professional relationships and for the exchange of information.

There has been an increase in recent years in the number of non-scientific officers participating in managerial development seminars and conferences.

2.4. Distribution of Activities

2.4.a. Regional Distribution of Operating Funds

Table 2.4.a.1. - presents a detailed summary of the Department's financial allocation for operational expenses for research during the fiscal year 1967-68. It shows the funds available to each establishment of each of the five units within each province. It is based exclusively on geographic location of establishments and not on function.

If it is intended to show how spending pattern is related to local or regional responsibilities of research, then one must recognize that certain establishments, notably in the Ottawa-Hull area, have a national rather than regional responsibility. Their research problems are of the general rather than specific type and likely to provide background information applicable in many regions. It is not suggested that the national establishments are exclusively concerned with basic research programs but it would be equally incorrect to assign them to represent a provincial effort. Conversely, regional establishments are not restricted to a program of applied research if it is necessary to the solution of a regional problem to undertake research in depth.. Their responsibility is, however, circumscribed by regional or local requirements.

A more revealing indication of regional activity, as contrasted to nationally directed effort, may be obtained if the establishments within the Ottawa-Hull area (excluding the Ottawa Research Station), London Research Institute, Belleville Research Institute, the Grain Research Laboratory at Winnipeg, and the Animal Pathology Division at Grosse Ile are not assigned to their respective provincial quotas. This has been done in the summary presented in Table 2.4.a.2. These are establishments concerned with national programs.

It will be noted from Table 2.4.a.2. that regional expenditures represent 62% of total operating funds and national expenditures 38%. It will also be noted that the Atlantic Provinces, Ontario, and British Columbia receive about 9 to 10% of the funds, whereas the Prairie Provinces are allocated 27% and Quebec 6%.

Table 2.4.a.1.

Geographic Spending Pattern of 1967-68 Operating Funds,
Canada Department of Agriculture Scientific Activities

	<u>Intramural</u>	<u>Extramural</u>	<u>Total</u>
	\$	\$	\$
<u>Newfoundland</u>			
Research Branch			
St. John's West	322,559		322,559
<u>Prince Edward Island</u>			
Research Branch			
Charlottetown	646,421		
Summerside	47,585		
Grants		8,500	
Departmental Library	5,390		
	699,396	8,500	707,896
<u>Nova Scotia</u>			
Research Branch			
Kentville	1,038,451		
Nappan	365,972		
Economics Branch			
Truro (Maritimes)	32,615		
Departmental Library	7,493		
	1,444,531		1,444,531
<u>New Brunswick</u>			
Research Branch			
Fredericton	1,267,503		
Animal Pathology Division			
Sackville	109,386		
Departmental Library	18,194		
	1,395,083		1,395,083
<u>Quebec (except Hull)</u>			
			3,870,069
Research Branch			
Caplan	42,983		
L'Assomption	238,691		
Lennoxville	612,762		
Normandin	195,655		
Quebec	79,788		
La Pocatiere	550,728		
St. Jean	457,945		
Grants		130,985	
Animal Pathology Division			
Grosse Ile	112,179		
Macdonald College	67,592		
Departmental Library	14,171		
	2,372,494	130,985	2,503,479

Special Committee

Geographic Spending Pattern of 1967-68 Operating Funds (Cont'd)

	<u>Intramural</u> \$	<u>Extramural</u> \$	<u>Total</u> \$
<u>Ottawa-Hull</u>			
Research Branch			
Branch Administration	2,660,283		
Research Services	774,912		
Research Institutes	6,166,216		
Grants		28,900	
Economics Branch	989,846		
Animal Pathology Division			
Division Administration	339,267		
Hull Laboratory	911,233		
Departmental Library	396,594		
	12,238,351	28,900	12,267,251
<u>Ontario (except Ottawa Headquarters)</u>			
Research Branch			
Belleville	713,315		
Chatham	49,237		
Delhi	317,128		
Fort William	42,953		
Harrow	917,078		
Kapuskasing	268,522		
London	841,774		
Ottawa	1,081,155		
Smithfield	187,144		
Vineland	500,858		
Grants		158,205	
Animal Pathology Division			
Guelph	35,480		
Departmental Library	68,871		
	5,073,515	158,205	5,231,720
<u>Manitoba</u>			
Research Branch			
Brandon	635,691		
Morden	446,600		
Winnipeg	1,083,221		
Grants		78,000	
Animal Pathology Division			
Winnipeg	31,863		
Board of Grain Commissioners			
Grain Research Laboratory	554,388		
Departmental Library	25,842		
	2,777,605	78,000	2,855,605

Geographic Spending Pattern of 1967-68 Operating Funds (Cont'd)

	<u>Intramural</u>	<u>Extramural</u>	<u>Total</u>
	\$	\$	\$
<u>Saskatchewan</u>			
Research Branch			
Indian Head	263,057		
Melfort	376,927		
Regina	280,714		
Saskatoon	970,411		
Scott	177,883		
Swift Current	1,187,967		
Grants		93,660	
Economics Branch			
Regina (Prairies)	150,266		
Animal Pathology Division			
Regina	36,696		
Departmental Library	36,077		
	<u>3,479,998</u>	<u>93,660</u>	<u>3,573,658</u>
<u>Alberta</u>			
Research Branch			
Beaverlodge	530,323		
Fort Vermilion	97,125		
Lacombe	847,195		
Lethbridge	2,641,691		
Grants		59,600	
Animal Pathology Division			
Lethbridge	272,047		
Departmental Library	21,079		
	<u>4,409,460</u>	<u>59,600</u>	<u>4,469,060</u>
			10,898,323
<u>British Columbia</u>			
Research Branch			
Agassiz	594,907		
Kamloops	354,431		
Prince George	230,462		
Saanichton	291,177		
Summerland	1,078,599		
Vancouver	592,145		
Grants		66,900	
Economics Branch			
Vancouver	67,923		
Animal Pathology Division			
Vancouver	102,996		
Departmental Library	42,867		
	<u>3,355,507</u>	<u>66,900</u>	<u>3,422,407</u>

Special Committee

Geographic Spending Pattern of 1967-68 Operating Funds (Cont'd)

	<u>Intramural</u>	<u>Extramural</u>	<u>Total</u>
	\$	\$	\$
<u>Territories</u>			
Research Branch			
Fort Simpson	40,542		
Mile 1019, Alaska Hwy.	66,921		
	107,463		107,463
GRAND TOTAL	37,675,962	624,750	38,300,712

Table 2.4.a.2. CDA Regional/National Spending Pattern of 1967-68
Operating Funds for Research

AREA	RESEARCH BRANCH \$	ECONOMICS BRANCH \$	ANIMAL PATHOLOGY \$	LIBRARY \$	GRAIN RESEARCH LAB \$	TOTAL \$	%
Nfld.	322,559					322,559	0.8
P.E.I.	702,506			5,390		707,896	1.8
N.S.	1,404,423	32,615		7,493		1,444,531	3.8
N.B.	1,267,503		109,386	18,194		1,395,083	3.8
Atlantic	3,696,991	32,615	109,386	31,077		3,870,069	10.0
Quebec	2,309,537		67,597	14,171		2,391,300	6.2
Ontario	3,522,280		85,480	68,871		3,676,631	9.6
Manitoba	2,243,512		31,863	25,842		2,301,217	6.0
Saskatchewan	3,350,619	150,266	36,696	36,077		3,573,658	9.3
Alberta	4,175,934		272,047	21,079		4,469,060	11.6
Prairies	9,770,065	150,266	340,606	82,998		10,343,935	27.0
British Columbia	3,208,621	67,923	102,996	42,867		3,422,407	8.9
Territories	107,463					107,463	0.3
Regional	22,614,957	250,804	706,060	239,984		23,811,805	62
National	11,185,400	898,846	1,362,679	396,594	554,388	14,488,907	38
Total	33,800,357	1,240,650	2,068,739	636,578	554,388	38,300,712	
	88.3%	3.2%	5.4%	1.7%	1.4%		

2.4.b. and c. Regional Research Programs

Few countries in the world have the geographic variability of Canadian climate and soil and the special problems imposed by our northern latitude. To these, add the economic problems of long distances from markets, high level of population dispersion, and proximity of competing producers with climatic, technological and economic advantages.

CDA research resources allocation has attempted to meet the multiplicity of producer problems which can in most cases, be dealt with only in the area in which they occur. For example, certain crops can only be grown in certain areas. Tobacco, soybeans, corn, sugarbeets, winter wheat, sunflower, peaches, cherries, plums, grapes, etc., are restricted to the more temperate regions. Even those crops with broad geographic adaptability require more or less narrowly specialized varieties to realize maximum efficiency of production, whether this specialization is a response to climate or soil demands, or both. Varietal specialization may be necessitated by regional problems associated with pest or disease control, cultural practices or management.

The distribution of establishments of the Research Branch and programs assigned to each is shown in 2.1.c., and a detailed listing of projects by establishments is given in 2.9.1. In recent years the policy of regional organization has been to centralize research resources in fewer, larger establishments while maintaining smaller satellite stations for local field and laboratory experimentation. Where problems common to two or more establishments within a region or between regions can not justify duplication of research effort, decisions have been taken to designate responsibility to one station conditional on an equitable distribution of programs between establishments. These decisions have not been taken arbitrarily, but have followed the processes of consultation and evaluation as indicated in sections 2.2 and 2.7.

For example, the occurrence of potato wart disease and golden nematode in Newfoundland, and the threat of their spread to the mainland potato areas, dictated the need for research at the St. John's West Research Station. The problem of bringing the relatively extensive bog areas of Newfoundland into agricultural productivity could only be undertaken in the area.

The importance of the potato industry to the Maritime Provinces logically resulted in the development of a breeding program at Fredericton,

assigning at the same time major responsibility for research on soils and forage crop production to Charlottetown. The tree and small fruit production areas of the Annapolis Valley dictated that responsibility for research on these crops should be carried by the Kentville Research Station.

The mineral and organic soils of the southwestern area of Quebec and proximity to Montreal markets logically require that vegetable and truck gardening crops research should be located at the St. Jean Research Station. Here, too, is the centre of a large apple production area.

The lower St. Lawrence area is particularly concerned with forage crop production and responsibility for research on these crops, including research on their soils, has been assigned to the new station at Quebec City, with auxiliary responsibility at La Pocatiere, Caplan and Normandin.

The intensive early vegetable crops, glasshouse crops, processing field vegetable crops, and fruit crops, characteristic of Essex and Kent counties of southwestern Ontario requires the research attention of the Harrow Research Station.

The specialized tobacco crop area in southern Ontario has been efficiently safeguarded by the program of the Delhi Research Station.

In the Niagara Peninsula, responsibility for pest and disease control of fruit trees and grapes has been given to the Vineland Research Station, while other horticultural research responsibility is assumed by the Ontario Department of Agriculture Research Institute at this location.

It is to be expected that research on crops of southern Manitoba such as flax, sunflower, vegetables and fruits should be a responsibility of the Morden Research Station and that cereal research for the eastern prairies be assigned to the Winnipeg Research Station and for the western prairies to the Lethbridge Research Station.

The irrigated and milder areas of southern Alberta where crops such as winter wheat and vegetables can be studied is the area in which research on these crops should be located and the Lethbridge Research Station has responsibility.

The Beaverlodge Research Station, with satellite stations at Fort Simpson, Prince George, Fort Vermilion and Mile 1019 on the Alaska Highway, is strategically located to cope with the problems of northern agricultural development such as forage crop breeding and seed production.

The unique orchard production of the B.C. Interior presents special problems which are dealt with by the Summerland Research Station in the Okanagan Valley.

The Vancouver Research Station has special responsibility for the problems of potato, small fruit, and vegetable crops for the Lower Fraser and Delta areas.

It is to be expected that research on ornamental crops should be located at the Saanichton Research Station in the centre of bulb and cut flower production on Vancouver Island.

Animal production problems, including those of poultry, beef and dairy cattle, swine and sheep, are less likely to be affected by regional conditions and major concentration on research has been centred at the Animal Research Institute and the Animal Diseases Research Institute in Ottawa and Hull, respectively. Many other research stations, however, participate in the animal research programs.

For a more detailed and complete tabulation of regional research responsibility areas, please refer to Section 2.1.c.

One cannot escape the conclusion that agricultural production and the problems associated with it are intimately related to regional conditions and limitations. To cope with this wide spectrum of research demands the Research Branch alone maintains 27 research stations, 14 experimental farms and 17 substations and special units.

2.4.d. Contribution to Regional Development

For an account of the contribution that CDA research has made to regional development, refer to section 2.8.9 and 2.8.10.

2.4.e. Cost/Benefits of Regional Distribution

In the regional allocations of CDA research resources it must be remembered that the present distribution represents the result of 80 years of organizational evolution, influenced by many factors and considerations such as historical, political, sociological, physical and biological. Not the least of these, of course, is the number and variety of problems to be resolved and the economic returns to be realized. Admittedly, many of the decisions were intuitively made, without benefit of current managerial techniques. But even the most sophisticated planner would be hard pressed to establish numerical values for political and sociological determinants.

The present distribution of CDA research establishments is justified upon two major considerations; (a) the centralization of national programs in large establishments to take advantage of multidisciplinary capabilities and the financial economy of shared facilities and, (b) the decentralization of regional research stations and their satellite sub-stations, experimental farms and special units, in order to cope with problems which can only be investigated locally. Decentralization may be more costly but there is little choice available. There are other benefits or advantages to be gained by maintaining regional stations in that a closer relationship with the agricultural community is fostered. The problems of the growers are brought to the attention of the researcher, very often on a personal basis, and conversely, the researcher can communicate directly information required by the grower. There is established a sense of personal involvement and interest of the grower in the research activities of the local research establishment.

2.5 Personnel Associated with Scientific Activities

2.5.a. Current Personnel Establishment and Strength

Table 2.5.a.1: CDA strength as of Aug. 10, 1968, was 9,506.

Of this number, 3,948 are engaged in research activities or in support of these activities. Thus, 41.5% of the Departmental strength is associated with scientific activities.

Table 2.5.a.2: Summarizes the distribution of personnel associated with scientific activities by units. It shows that of the total establishment positions (4,620) about 85% (3,948) are filled; of the scientific and professional positions about 91% are filled (1,083 of 1,187).

Of the total number of positions (4,620) about 26% (1,187) are allocated for scientific and professional staff. Thus for every scientific and professional individual there are three people required in administrative, operational, and technical support functions. While a ratio of 1 to 3 for scientific to support staff may appear to be high, one must take into account that a considerable part of the research in the Research Branch involves field experimentation which has a substantial requirement for technical and operational staff. Furthermore, the large number of research establishments across the whole of Canada means that a greater maintenance and operational staff is required compared with a centralized establishment.

Table 2.5.a.3: A summary of Postdoctoral Fellows, who have held fellowships in CDA establishments during the period 1962-63 to 1968-69 and their nationality.

2.5.b. Number of Professional Staff in Administration

Table 2.5.b.: Shows that about 11% of professionals serve in administrative functions. Of the scientific staff about 9% devote most of their time to administration. Here again the regional dispersion of establishments necessitates a large commitment of research staff to administration, mainly in the function of research management.

2.5.a.1 TOTAL STRENGTH CDA/TOTAL STRENGTH RESEARCH (FULL TIME ONLY) - AUGUST, 1968

CATEGORIES	CDA	RESEARCH	RESEARCH STRENGTH AS % OF TOTAL STRENGTH
EXECUTIVE	14	4	28.5
SCIENTIFIC AND PROFESSIONAL	2097	1083	51.6
ADMINISTRATIVE AND FOREIGN SERVICE	331	47	14.1
TECHNICAL	3105	964	31.0
ADMINISTRATIVE SUPPORT	1672	743	44.4
OPERATIONAL	2287	1377	60.2
	9506	3948	41.5

2.5.a.2 CDA RESEARCH UNITS, CURRENT PERSONNEL ESTABLISHMENT AND STRENGTH (FULL TIME ONLY) - AUG. 1, 1968

CATEGORIES	LIBRARY		ECONOMICS BRANCH		RESEARCH BRANCH		ANIMAL PATHOLOGY		GRAIN RESEARCH LABORATORY		TOTAL POSTI- TIONS	TOTAL STRENGTH
	Pos.	Str.	Pos.	Str.	Pos.	Str.	Pos.	Str.	Pos.	Str.		
EXECUTIVE	-	-	1	1	3	3	-	-	-	-	4	4
SCIENTIFIC AND												
PROFESSIONAL	37	28	76	67	987	920	67	54	20	14	1187	1083
ADMINISTRATIVE AND FOREIGN SERVICE	-	-	2	2	39	42*	3	3	1	-	45	47
TECHNICAL	2	4*	12	6	977	830	99	85	42	39	1132	964
ADMINISTRATIVE SUPPORT	68	56	47	47	374	340	21	22*	-	-	519	473
OPERATIONAL	-	-	-	-	1652	1305	81	72	-	-	1733	1377
	107	88	138	123	4030	3440	271	236	72	61	4620	3948 +

*POSITIONS ON LOAN FROM OTHER ESTABLISHMENTS

+DOES NOT INCLUDE 23 POST DOCTORATE FELLOWS. See Table 2.5.a.3.

Table 2.5.a.3. CDA Postdoctoral Fellows, 1962-1968

(a) Location	62-63	63-64	64-65	65-66	66-67	67-68	68-69	TOTAL
E.R.I.	1	3	1	2	2	2	2	13
A.R.I.	3	3	3	-	1	-	2	12
C.B.R.I.	3	1	2	1	1	2	2	12
London	3	-	1	2	2	2	2	12
S.R.I.	2	2	2	1	1	1	1	10
Ottawa	2	-	1	1	2	1	2	9
Winnipeg	-	1	1	1	1	2	2	8
Lethbridge	2	-	1	2	1	-	-	6
F.R.I.	-	2	1	-	1	1	1	6
Saskatoon	-	-	1	1	1	1	2	6
P.R.I.	1	-	1	1	1	1	-	5
Belleville	-	-	-	2	-	-	-	5
Grain Res. Lab.	-	1	1	1	-	-	1	4
Vancouver	-	1	1	1	-	-	1	4
Fredericton	-	-	-	1	1	1	1	4
A.C.R.S.	1	1	-	-	-	-	1	3
Vineland	-	1	-	-	-	-	1	2
Harrow	-	-	-	-	1	-	-	1
Kentville	-	-	-	-	-	1	-	1
Summerland	-	-	-	-	-	1	-	1
Lacombe	-	-	-	-	-	-	1	1
YEAR TOTAL	18	16	17	17	17	17	23	125
<hr/>								
(b) Nationality								
Indian	5	2	4	5	6	4	5	31
Japanese	8	7	4	5	2	-	2	28
British	-	1	4	2	-	1	4	12
Czech	-	-	-	1	2	3	3	9
Canadian	2	2	1	1	1	-	1	8
German	-	2	1	-	-	1	1	5
Australian	-	-	-	1	2	1	1	5
Norwegian	2	1	-	-	-	-	-	3
Polish	-	-	1	1	-	1	-	3
Pakistani	-	-	1	1	1	-	-	3
Chinese	-	-	-	-	-	1	2	3
Israeli	-	-	-	-	1	1	-	2
Danish	-	-	-	-	-	1	1	2
Swiss	-	-	-	-	1	1	-	2
Irish	1	-	-	-	-	-	-	1
Hungarian	-	1	-	-	-	-	-	1
Ghanian	-	-	1	-	-	-	-	1
Italian	-	-	-	-	1	-	-	1
Egyptian	-	-	-	-	-	1	-	1
Ceylonese	-	-	-	-	-	1	-	1
Yugoslavia	-	-	-	-	-	-	1	1
Spanish	-	-	-	-	-	-	1	1
S. African	-	-	-	-	-	-	1	1
YEAR TOTAL	18	16	17	17	17	17	23	125

2.5.b. STRENGTH/ADMINISTRATION - RESEARCH (PROFESSIONAL CLASSES ONLY)

CATEGORIES	STRENGTH	ADMINISTRATION	ADMINISTRATION AS A PERCENT OF STRENGTH
EXECUTIVE	4	4	100
SCIENTIFIC AND PROFESSIONAL	1083	95	8.7
ADMINISTRATIVE AND FOREIGN SERVICE	47	30	63.8
	1134	129	11.3

2.5.c. i to iii. Country of Birth/Country in which Degree Taken

Table 2.5.c.i-iii.: Of the 1208* professional staff members engaged in or associated with scientific activities, 874 or 70% were born in Canada.

Of the total professional staff, 46% were at the doctorate level, 23% at the master's level, and 31% at the bachelor's level.

The role of Canadian university postgraduate faculties in providing trained scientific staff is indicated by the fact that 30% of the Ph.D.'s and 66% of the Master's received their degrees from Canadian universities. In contrast 43% of the Doctorates and 17% of the Masters were from U.S. universities, most of whom were Canadians who took their undergraduate training or training to the Master's level in Canada. Records are not readily available to us showing precisely how many of Canadian birth took their primary and secondary education in Canada. It is apparent, however, that U.S. universities have been preferred by many Canadian graduates proceeding to their Ph.D. degree. This is probably partly due to the higher quality of U.S. graduate schools in special areas or absence of specialized graduate training in Canada. It may be partly due to more favourable financial support that could be obtained in U.S. universities.

Of the total number of currently employed Ph.D.'s (551), only 337 are of Canadian birth. That is 39% were recruited from foreign countries. By contrast 208 of 282 Masters and 302 of 375 Bachelors were of Canadian birth, i.e. 26% and 19% respectively of foreign birth.

*This total includes 1083 individuals with degrees who are in the Scientific and Professional category, plus 125 individuals with degrees in the Administrative and Technical categories (Table 2.5.a.1.)

2.5.c.i.-iii. COUNTRY OF BIRTH/COUNTRY IN WHICH DEGREE RECEIVED

Country of Birth			Country in Which Degree Rec'd*																	
Total	Country as a % of Total	Total Degrees			Canada			Gr. Britain			United States			Others			Unknown			
		Ph.D.	MA	BA	Ph.D.	MA	BA	Ph.D.	MA	BA	Ph.D.	MA	BA	Ph.D.	MA	BA	Ph.D.	MA	BA	
CANADA	874	70.1	337	208	302	111	151	276	10	-	-	171	40	2	43	12	11	2	5	13
BRITISH COMMONWEALTH	138	11.4	79	31	28	25	16	14	11	5	4	14	2	-	28	7	7	1	1	3
UNITED STATES	48	4.9	35	8	5	2	4	2	-	-	-	22	1	1	11	3	2	-	-	-
FRANCE	3	.2	3	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-	-	-
RUSSIA	9	.7	4	2	3	2	2	2	-	-	-	2	-	-	-	-	-	-	-	-
OTHER EUROPEAN	99	8.1	49	23	27	12	8	14	2	1	-	15	5	-	19	9	9	1	-	4
OTHER ASIATIC	44	3.6	27	10	7	5	4	3	-	-	-	8	2	-	14	4	4	-	-	-
SOUTH AMERICAN	2	.1	1	-	1	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-
ALL OTHERS	15	1.2	13	-	2	1	-	-	-	-	-	5	-	-	7	-	2	-	-	-
NOT AVAILABLE	3	.2	3	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-
1208	100	551	282	375	160	185	311	24	6	4	240	50	3	123	35	37	4	6	20	
DEGREES AS A % OF TOTAL GROUP		46%	23%	31%																
COUNTRY OF DEGREE AS A PER CENT OF TOTAL DEGREES		TOTAL			CANADA			GR. BRITAIN			UNITED STATES			OTHERS			UNKNOWN			
		Ph.D.	551	160	30%	24	4%	240	43%	123	22%	44	1%							
		MA	282	185	66%	6	2%	50	17%	35	13%	6	2%							
		BA	375	311	83%	1	1%	3	1%	37	10%	20	5%							
		1208																		

*Only highest degree counted.

2.5.c.iv.1-3. Number of years since graduation and number of years employed in CDA

These tables show the employment pattern in CDA. Tables 2.5.c.iv.1 shows the high Ph.D. employment in the last 20 years, a uniform employment rate for Masters and Bachelors.

Table 2.5.c.iv.3. indicates the large proportion of staff recruited without much prior experience.

Not shown in tables 2.5.c.iv.1-3, is the fact that an appreciable number of employees were able to return to university on educational leave for a higher degree, most after several years employment. For example, 230 employees obtained their Ph.D. subsequent to employment in CDA, most of these prior to 1958. In the last 10 years, however, relatively fewer employees are returning to university for their Ph.D. degrees.

2.5.c.iv.1. NUMBER OF YEARS SINCE GRADUATION - AGE OF DEGREE

YEARS SINCE DEGREE	Ph.D.		M.A.		B.A.		TOTAL
	Number	% of Total Group	Number	% of Total Group	Number	% of Total Group	
LESS THAN 1 YEAR	8	1%	3	1%	14	4%	25
1 THROUGH 6	157	29%	57	22%	94	26%	308
7 THROUGH 12	165	30%	45	17%	39	11%	249
13 THROUGH 18	130	24%	57	21%	67	19%	254
19 THROUGH 24	36	7%	41	15%	64	18%	141
25 THROUGH 30	26	5%	39	15%	37	10%	102
31 OR MORE	22	4%	25	9%	42	12%	89
UNKNOWN	7		15		18		40
	551		282		375		1208

AVERAGE AGE OF DEGREE	Ph.D.	M.A.	B.A.
	11 years	15 years	14 years

Special Committee

2.5.c.iv.2. YEARS EMPLOYED - CDA

YEARS OF EMPLOYMENT	Ph.D.		M.A.		B.A.		TOTAL
	NUMBER EMPLOYED	% OF TOTAL GROUP	NUMBER EMPLOYED	% OF TOTAL GROUP	NUMBER EMPLOYED	% OF TOTAL GROUP	
LESS THAN 1 YEAR	25	5%	14	5%	28	7%	67
1 THROUGH 6	169	31%	77	27%	146	39%	392
7 THROUGH 12	91	16%	24	8%	51	14%	166
13 THROUGH 18	118	21%	53	19%	59	16%	230
19 THROUGH 24	92	17%	58	21%	62	16%	212
25 THROUGH 30	24	4%	26	9%	15	4%	65
31 OR MORE	32	6%	30	11%	14	4%	76
	551		282		375		1208
AVERAGE LENGTH OF EMPLOYMENT	Ph.D. 13 YEARS		M.A. 14 YEARS		B.A. 11 YEARS		

2.5.c.iv.3. YEARS OF EXPERIENCE PRIOR TO CDA EMPLOYMENT¹

YEARS OF EMPLOYMENT	Ph.D.		M.A.		B.A.		TOTAL
	NUMBER EMPLOYED	% OF TOTAL GROUP	NUMBER EMPLOYED	% OF TOTAL GROUP	NUMBER EMPLOYED	% OF TOTAL GROUP	
HIRED IN GRADUATING YEAR	98	40%	14	14%	62	31%	174
1 THROUGH 3	66	27%	48	49%	49	25%	163
4 THROUGH 6	32	13%	19	20%	26	13%	77
7 THROUGH 10	16	7%	11	11%	11	5%	38
10 OR MORE	31	13%	6	6%	53	26%	90
	243		98		201		542

¹POPULATION INCLUDES ALL PRESENT EMPLOYEES HIRED SINCE 1956 WHO HELD DEGREE ON ENTRY.

2.5.c.v. Average Age

Table 2.5.c.v. Shows a fairly normal age distribution in all three degree categories.

Table 2.5.c.vi. This table is based upon information at recruitment and does not indicate bilingual effectiveness obtained while employed in CDA. It refers only to oral ability which is probably a reasonable criterion of operational effectiveness. The data show only about 13% of professional staff as being bilingually effective. The reasons for this low proportion are apparent and improvement in this ability is to be expected with current training policy.

2.5.c.v. AGE ANALYSIS OF PROFESSIONAL POPULATION

AGE	Ph.D.		M.A.		B.A.		TOTAL
	NUMBER IN AGE GROUP	% OF TOTAL GROUP	NUMBER IN AGE GROUP	% OF TOTAL GROUP	NUMBER IN AGE GROUP	% OF TOTAL GROUP	
65 or more	7	1%	5	2%	3	1%	15
60 through 64	21	4%	26	9%	24	7%	71
55 through 59	40	7%	41	15%	38	10%	119
50 through 54	59	11%	34	12%	41	11%	134
45 through 49	119	22%	53	19%	69	19%	241
40 through 44	105	19%	39	14%	35	9%	179
35 through 39	99	18%	21	7%	42	11%	162
30 through 34	75	14%	31	11%	33	9%	139
25 through 29	24	4%	28	10%	46	12%	98
20 through 24	-	-	4	1%	42	11%	46
15 through 19	-	-	-	-	1	-	1
Not Available	2	-	-	-	1	-	3
	551		282		375		1208

Average Age Ph.D. - 43 Years M.A. - 45 Years B.A. - 41 Years

2.5.c.vi. LANGUAGE ABILITY AT RECRUITMENT

SPEAKS	Ph.D.		M.A.		B.A.		Total	%
	Total	% of Group	Total	% of Group	Total	% of Group		
ENGLISH ONLY	495	90%	242	86%	308	82%	1045	87%
FRENCH ONLY	-	-	1	-	2	-	3	
ENGLISH & FRENCH	55	10%	39	14%	61	16%	155	13%
NOT AVAILABLE	1	-	-	-	4	-	5	
	551		282		375		1208	

2.5.c.vii. ACADEMIC DISCIPLINE

SUBJECT	Ph.D.	M.A.	B.A.
Biology	13	10	22
Botany and Plant Pathology	41	9	3
Plant Pathology	73	14	7
Bacteriology	11	3	3
	138	36	35
Zoology	6	4	8
Entomology	87	41	15
	93	45	23
Agronomy	65	48	32
General Agriculture	8	5	15
Horticulture	19	17	14
	92	70	61
Animal Husbandry	20	4	11
Dairying	4	-	-
Poultry	4	4	2
Veterinary Science	3	3	24
	31	11	38
Nutrition (Plant and Animal)	11	5	-
Agricultural chemistry	59	11	29
Physics	3	1	1
Soils	35	31	16
	97	43	46
Engineering	-	3	3
Agricultural Engineering	-	7	12
General Arts	-	1	6
General Science	-	1	10
Library Science	-	4	18
Economics	7	14	33
Dietetics	-	-	1
All Others	69	28	42
Not Available	13	14	46
	551	282	375

2.5.d. and e. Strengths and Separations, 1963-68

Table 2.5.d.-e. Over the 5-year period there has been a slight increase of professional staff from 1,052 to 1,208 or about 15%. The separation rate for doctorate and master staff has remained at about 6% but the rate of bachelor separation has been about twice this level, probably because of the low salaries available to the bachelors' group. A large proportion of the separations in the doctorate group accepted university appointments as shown in section 2.8.6.

2.5.d. and e. 1. STRENGTH AND SEPARATIONS 1963-68

YEAR	DOCTORATE			MASTERS			BACHELORS			TOTAL
	SEPARATED	HIRED	YEAR END STRENGTH	SEPARATED	HIRED	YEAR END STRENGTH	SEPARATED	HIRED	YEAR END STRENGTH	
1963	26	28	501	13	20	249	30	44	302	1052
1964	31	24	494	6	17	260	34	33	301	1055
1965	37	53	510	18	16	258	34	54	321	1057
1966	25	36	521	25	59	260	43	54	332	1113
1967	37	42	526	19	27	268	47	62	347	1141
1968	N/A	28	551	N/A	28	282	N/A	25	375	1208

2. PROJECTED - 1969-72

	DOCTORATE		MASTERS		BACHELORS		TOTAL
	SEPARATED	HIRED	SEPARATED	HIRED	SEPARATED	HIRED	
	2% per year		3% per year		3% per year		
1969		562		290		386	1238
1970		573		299		398	1270
1971		584		308		410	1302
1972		596		317		422	1335

3. AVERAGE SEPARATION RATE - 1963-67

DOCTORATE 6%
MASTERS 6%
BACHELORS 12%

4. RATE OF INCREASE IN TOTAL DEGREE STRENGTH - 1963-68 :

15% for 5-year period OR
3% per year.

2.5.g. EDUCATIONAL LEAVE 1968-69

MASTERS IN SCIENCE	3
MASTERS IN LIBRARY SCIENCE	1
SPECIAL STUDIES	1
DOCTORATE	20

2.5.h. UNIVERSITY STUDENTS* - SUMMER EMPLOYMENT IN RESEARCH ACTIVITIES

STUDENT ASSISTANTS	1963	1964	1965	1966	1967	TOTAL
	195	182	172	167	179	895

*Does not include university students employed in other than student assistant positions.

2.6. Expenditures Associated with Scientific Activities2.6.a. Total Funds by Function, Discipline and Area of Application

In Table 2.6.a. the total spending of the Department on scientific activities is presented.

It is not possible to break down the total expenditures on a scientific discipline basis. If one regards agriculture science as a discipline area, then all biological, physical, and social sciences contributing to agriculture can be included under agricultural science.

Similarly, no financial breakdown on the basis of area of application has been attempted since all activities of the Department are directed towards agricultural applications, irrespective of incidental secondary applications.

2.6.b. Operating and Capital Expenditures by Units

Table 2.6.b. shows the actual operating and capital expenditures for CDA scientific activities by units for each year 1962-63 to 1967-68.

2.6.c. Expenditures on University Education of Staff

Table 2.6.c. summarizes the cost of the Departmental educational leave program as it applies to those engaged in scientific activities. For additional information, see Section 2.3.e.

Table 2.6.a. Total Spending on Scientific Activities by Functions

Fiscal Year	Intramural R&D	Scientific Information	Support of ¹ R&D in Universities	Other ² Support of R&D	Total
	\$	\$	\$	\$	\$
1962-63	28,982,234	703,012	147,037	-	29,832,283
1963-64	30,232,530	709,047	124,862	85,000	31,151,439
1964-65	30,897,261	829,132	144,645	47,500	31,918,538
1965-66	35,116,289	916,554	145,000	20,000	36,197,843
1966-67	38,002,256	1,127,671	443,766	9,668	39,583,361
1967-68	42,499,354	1,430,384	624,750	28,000	44,582,488
1968-69	44,634,220	1,301,380	960,000	50,000	46,945,600

¹Including support of higher education in engineering and science

²Annual grants to the Agricultural Economics Research Council

Table 2.6.b. Actual Operating and Capital Spending for the Six-year Period from 1962-63 to 1967-68

	Research Branch	Economics Branch	Animal Pathology Division	Grain Research Laboratory	Dept'l. Library	Total
	(\$000)	(\$000)	(\$000)	(\$000)	(\$000)	(\$000)
1962-63						
Operating	23,672	906	1,265	372	250	26,465
Capital	3,285	2	50	27	3	3,367
Total	26,957	908	1,315	399	253	29,832
1963-64						
Operating	23,758	987	1,657	375	258	27,035
Capital	3,832	6	241	35	3	4,117
Total	27,590	993	1,898	410	261	31,152
1964-65						
Operating	24,983	979	1,273	408	301	27,944
Capital	3,855	4	40	71	4	3,974
Total	28,838	983	1,313	479	305	31,918
1965-66						
Operating	27,612	972	1,593	475	344	30,996
Capital	4,981	7	145	63	7	5,203
Total	32,593	979	1,738	538	351	36,199
1966-67						
Operating	31,199	1,041	1,888	543	508	35,179
Capital	4,250	4	74	63	13	4,404
Total	35,449	1,045	1,962	606	521	39,583
1967-68						
Operating	33,801	1,241	2,069	554	637	38,302
Capital	5,894	7	206	97	78	6,282
Total	39,695	1,248	2,275	651	715	44,584

Table 2.6.c. Cost of University Education of Staff Engaged in Scientific Activities

Fiscal Year	No. of Employees	Educational Leave		
		Cost	Local Course Fees	Total Costs
1962-63	22	\$ 42,100	-	\$ 42,100
1963-64	20	42,800	-	42,800
1964-65	25	59,160	694	59,854
1965-66	25	68,103	1,450	69,553
1966-67	24	75,941	1,470	77,411
1967-68	23	69,755	3,440	73,195
1968-69	25	168,431	5,000	173,431

2.7. Research Policies2.7.a. Units Concerned with Intramural Research Activities2.7.a.1. Selection, Initiation and Monitoring of Programs and Projects

Research Branch. Since the responsibility of the Research Branch is to solve agricultural production problems in order to maintain or improve yield and/or quality of produce, the first task is obviously to identify the problem. Identification may be achieved by one of several routes. It may result from a grower or grower association inquiry, a provincial agricultural representative inquiry, or a direct provincial or federal departmental request, or a request from industry. Regulatory or inspection activities may indicate problem areas. General surveys may disclose specific problems, often incidental to the purpose of the survey. However, the majority of research problems are identified intramurally by those engaged in research or in research administration. Occasionally, projects are undertaken as a collaborative effort at the request of international agencies.

A preliminary appraisal of the problem will indicate the type of approach that will be required, whether a short term developmental or applied project or program is indicated, or whether a long term research project or program, possibly interdisciplinary and basic, will be required. On the basis of this appraisal, the research scientist will prepare a project proposal or a project leader will be requested to do so.

The "Project System" currently in use in the Research Branch specifies the form and procedures for preparation of proposals, for authorization, reporting and review of projects. It provides an inventory (Appendix 12) covering projects and represents the research effort of over 800 man/years.

The project outline specifies the title, objective, anticipated duration, personnel, number of man/years, reasons for undertaking the project, a review of pertinent literature, plans for undertaking the work, and any special facilities or equipment requirements.

The project proposal prepared by the research scientist is approved by the establishment director, forwarded to the Assistant Director General for the region concerned, and referred to the Research Coordinator in whose discipline area the project falls. The project outline is reviewed by the Coordinator and may be altered but only in consultation with the research officer who prepared the outline and with the approval of his director. The Coordinator then recommends on the acceptability of the proposal and rates it as to priority

(described below). He must defend his recommendation before the group of Research Coordinators and, if acceptable, the recommendation is forwarded to the Assistant Director-General for authorization.

No project is authorized for more than five years and an annual report on progress is required. Annual progress reports are referred to the Research Coordinator concerned and may be discussed with the personnel involved by correspondence and/or by personal visits to the research station. At the end of the authorized five-year period, a summary report must be prepared requesting renewal, revision, or discontinuance of the project. In the case of renewal or revision, the proposal must go through the same channels as a new project proposal. Projects may be terminated at any time.

Project files are maintained at headquarters by the Scientific Information Section and are accessible to the Executive or Coordinators at all times.

Program areas are usually discussed by the Coordinators Group whenever a new project proposal is considered. To this extent there is, in effect, a continuing review of program. Special program area reviews may be carried out by the Coordinators as well. Special work-planning meetings may be convened by a Research Coordinator to review a selected area of program. Attendance at work-planning meetings is not restricted to Research Branch scientists involved in the program but by invitation personnel from other federal departments, universities, provincial departments, and industry may participate. Recommendations emanating from work-planning meetings are referred to the Research Coordinators group and finally to the Executive. Additionally, program reviews are held at national or provincial meetings, whether sponsored by N.C.R. associate committees or by CASCC committees, or whether they are convened under provincial, departmental or interdepartmental jurisdiction.

Economics Branch. It has been the practice of the Branch to have a "full dress" annual review of work in progress, together with consideration of suggested new projects. In preparation for this, units and sections prepare project statements and progress reports. Regional offices review work with university and provincial government departments and submit their recommendations to headquarters. The Director-General consults the Deputy Minister and other senior officers on programs. Division heads and other senior officers visiting the Branch's regional offices confer on programs and often have meetings with provincial authorities and farm leaders on research needs. Reviews are

continually being requested and preliminary reports are quite usual for most studies in addition to the annual review.^{1/}

At the Section level there is a continuing review of the work in the light of the current situation and anticipated developments. At Division level, several meetings of professional staff are held annually in order to review the current and proposed programs of work. These meetings provide frequent opportunities for review of individual studies and their relation to the overall program of the Division and the Branch.^{1/}

2.7.a.2. Program and Project Priorities

With project coverage of such magnitude and diversity in the Department, program management becomes correspondingly complex. The unpredictability of the research activity and resistance to cost-benefit analysis further complicate management problems and make comparative evaluation of programs a matter of highly subjective judgment. The subject of strategic management of agricultural research was recently reviewed in a paper by J.A. Anderson and M.E. Andal, both at the time members of the Canada Department of Agriculture, and presented at the 1966 meeting of the Research Section, CASCC. A copy of this paper is attached as Appendix 6.

Despite the fact that we are painfully aware that some reliable system of project rating must be utilized for purposes of program management, and despite all that has been written on various systems, we have not yet succeeded in devising or adapting a procedure entirely satisfactory to our purpose. For the present we are attempting to rate projects as A, B or C priority at the time of submission as a new proposal or as a renewal of an existing authorized project. These ratings are based upon two major considerations:

- 1) The importance and effectiveness of the anticipated solution of the problem to a specific program area and to the national program, including such factors as economic, political, sociological, statutory and scientific importance and with proportionate and reasonable emphasis on the national vs. local implications.

- 2) The assessment of the project as a piece of research and its contribution to the solution of the problem, including such considerations as adequacy of the plan, capability of the staff, availability of resources, and feasibility in relation to the objective.

^{1/} Extracted from Answers to Questionnaire - Project No. 8, of the Royal Commission on Government Organization, Economics Division, Canada Department of Agriculture, May 24, 1961, p. 55.

Obviously a rating such as this represents a highly intuitive assessment, still it is the consensus decision of twelve Research Coordinators drawn from different scientific discipline areas.

Priority rating for project and program authorization has its counterpart in priority rating for vacant positions. Before a vacant position can be filled, the duties of the position must be justified upon project and program priorities. The same is applied to the establishment of new positions, for it is by this means that program changes can most readily be effected.

2.7.a.3. Program Evaluation Techniques

Departmental management, research managers and many research officers are aware of network analysis (such as PERT and CPN), and some have applied its principles to their research programs in an elementary fashion, but it has been neither formally nor widely adopted as a management tool. Since network analysis offers techniques for planning and controlling to achieve quantitative goals within specified periods of time, the likelihood of adopting it for developmental programs will be increased by the introduction of "Management by Objectives" and "Program Budgeting" (see Section 2.2.d.). Its value in basic research is highly questionable owing to the difficulty of making meaningful estimates of the probability of a critical scientific "breakthrough" within a given period of time (Appendix 6).

2.7.a.4. Extramural Research Contract Grants

The Department provides funds for "Extramural Research Contract Grants" designed to support research on problems of direct concern to any one of the various Branches of CDA.

Contract Grants are awarded in fields where the Department lacks special research facilities and/or competence available elsewhere, e.g. university or provincial research establishment, and where the contracted project will provide the solution to an urgent problem or will make an essential contribution to an intramural program. They may be initiated by the Department to assist in filling a serious gap in the total agricultural research effort in Canada.

EMR Contract Grant proposals are prepared by the applicant after consultation and negotiation with a senior officer of the Department. Control of Contract Grants is vested in a CDA Committee appointed by and responsible to the Deputy Minister. They are awarded on an annual basis, subject to renewal if satisfactory progress is indicated.

The EMR Contract Grants program was begun in 1949 and the distribution over the 20-year period is shown in Table 2.7.a.4.i.

Table 2.7.a.4.i. CDA Extramural Research Contract Grants - 1949 to 1968

FISCAL YEAR	INSTITUTIONS	GRANTS	TOTAL GRANTS	AVERAGE GRANT
1949-50	9	12	\$ 20,600	\$1,717
1950-51	11	12	40,000	3,333
1951-52	9	11	34,500	3,136
1952-53	16	28	98,875	3,531
1953-54	20	31	116,205	3,749
1954-55	16	30	92,200	3,073
1955-56	15	33	120,275	3,645
1956-57	12	40	125,225	3,131
1957-58	12	36	127,100	3,531
1958-59	10	26	132,075	5,080
1959-60	10	34	176,710	5,197
1960-61	10	32	159,780	4,993
1961-62	11	32	150,265	4,696
1962-63	12	35	147,040	4,201
1963-64	11	32	128,580	4,018
1964-65	12	36	144,645	4,018
1965-66	12	34	145,000	4,265
1966-67	12	30	140,750	4,692
1967-68	15	25	144,780	5,791
1968-69	15	22	145,245	6,602

The distribution of EMR Contract Grants for the last fiscal year are shown regionally in Table 2.7.a.4.ii. and by projects in Appendix 7.

Table 2.7.a.4.ii. CDA Extramural Research Contract Grants.

Regional Distribution, 1967-1968.

St. Dunstan's University	\$ 8,500
Macdonald College	9,300
Carleton University	19,000
University of Ottawa	9,900
Queen's University	8,000
University of Toronto	15,880
University of Guelph	13,000
University of Western Ontario	7,000
University of Manitoba	3,000
Saskatchewan Research Council	4,000
University of Saskatchewan	15,500
University of British Columbia	22,700
University of Victoria	1,000
British Columbia Research Council	8,000
	\$144,780

The following contractual arrangements in the field of agricultural economics were undertaken:

(a) Development of the Canadian Farm Management Data System (CANFARM)

1. Contract signed June 30, 1966 with Professor R. Nicholson, University of Saskatchewan, to assist officers of the Economics Branch, Department of Agriculture, develop a national system of mail-in electronically - processed farm record-keeping (later designated CANFARM).
Contract period: July 5, 1966 to August 19, 1966.
Compensation: \$1,500.
2. Contract signed March 9, 1967 with the University of Guelph for the services of Professor Darrel Plaunt to work with officers of the Economics Branch to specify details of basic data sheets which are to be recorded by farmers, to organize and describe the item and enterprise codes and to specify analysis to be carried out by the national mail-in record-keeping system. Contract period January 23, 1967 to September 30, 1967 except for the period August 1-17, 1967.
Compensation: \$9,600 in eight equal monthly payments of \$1,187.50 starting February 28, 1967.
3. Contract signed July 13, 1967 with the University of Saskatchewan, to provide the services of Professor R.C. Nicholson to work with officers of the Economics Branch, Department of Agriculture on the development of a National Mail-in Electronically Processed Farm Record Keeping System (now CANFARM). Details were specified.
Contract period: July 1, 1967 to September 30, 1967. Payment: \$4,750.
4. Contract signed September 27, 1967 with Kates, Peat, Marwick and Co., to co-ordinate the preparation of documentation for Phase I of the Canadian Electronic Mail-in Farm Management Information System (now CANFARM); to assist the project team with preparation of schematics, code detail, etc; to prepare specifications and instructions for software supplier submissions, and to do other specified things.
Contract period: June 1, 1967 to October 15, 1967. Payment not to exceed \$18,500 plus allowances for subsistence and travelling expenses.
5. Contract signed January 24, 1968 with Kates, Peat, Marwick and Co., to develop and evaluate alternative plans for meeting the objectives of the Canadian Electronic Mail-in Farm Management Information

- System (later called the Canadian Farm Management Data System or CANFARM). More specifically, the firm was to (a) identify courses of action for processing farm data and maintaining a data library at a single location, at a central location with satellite processing centres, or at several decentralized locations; (b) define the goals, systems performance and costs of each alternative, and (c) establish criteria for the systems performance measurement. Contract period: November 13, 1967 to March 15, 1968. Payment not to exceed \$20 350.
6. Contract signed March 14, 1968 with Professor Darrel H. Plaunt, University of Guelph, to work with officials of the Economics Branch of the Department of Agriculture on the development of a National Mail-in Electronically Processed Farm Record Keeping System (now CANFARM). Contract terminated on March 31, 1968. Payment: \$1,400.
 7. Contract signed August 6, 1968 with Computer Sciences Canada, Ltd., to develop the computer systems design and programs for Phase I (monthly annual reports for the individual farmer) of the Canadian Farm Management Data System. Compensation not to exceed \$116,238.
 8. Contract signed July 8, 1968 with the University of Saskatchewan for the services of Dr. R.C. Nicholson to work at Guelph, Ontario and Saskatoon, Saskatchewan with officials of the Economics Branch of the Department of Agriculture on a project of a "Canadian Farm Management Data System" as follows: Assist in planning workshops for explaining phase I of the system, assist Departmental staff in monitoring the computer programming for Phase I, assist in the supervision of the preparation of farm data for testing the computer programs, assist the staff in updating the documentation for programming, review the initial manuals on field contract procedures and prepare complete item code table for inclusion in the computer programs. Contract period April 29 to August 31, 1968, Payment: \$4,825 paid as follows: \$2,400 on or about July 15, 1968 and the balance at the end of the period.
 9. Contract signed August 27, 1968 with Dr. Darrel H. Plaunt of the University of Guelph, to work with officials of the Economics Branch of the Department of Agriculture on the development of a Canadian Farm Management Data System (CANFARM). Compensation to be \$125 per day plus expenses not to exceed \$600. Contract period: July 22, 1968 to September 11, 1968.

(b) Other Projects

1. Contract signed June 9, 1967 with Professor George R. Winter, University of British Columbia. Professor Winter agreed, in essence, to serve as a consultant in the Marketing and Trade Services Division, Economics Branch, and to assist in developing a research program and associated methodology with particular reference to marketing institutions, marketing operations and demand analysis. Contract period: June 12, 1967 to September 15, 1967. Payment: \$4,600.
2. Contract signed October 18, 1967 with Mr. Ian S. McArthur of Ottawa. The contractor agreed to carry out a study of the economics of storage of fresh fruits and vegetables in Canada, with particular emphasis on the economics of scale. Period of contract: October 18, 1967 to November 30, 1967. Payment: \$125 per day plus travelling expenses.

2.7.a.5. Policies on Funding of Research Programs in Universities

As indicated in 2.7.a.4. CDA Extramural Research Contract Grants are specific contractual arrangements with non-federal research agencies for the solution of urgent agricultural problems or for supplementing intramural research programs. These Contract Grants are terminable in character and are not intended to support a general area of research on a continuing basis.

CDA Operating Grants

Commencing in 1966, the Canada Department of Agriculture, on the recommendation and under the guidance of the Canadian Agr. Services Coordinating Committee, initiated an Operating Grants program designed to assist the improvement of graduate education, to promote an optimum balance of research between governmental and university agencies in relation to the problems of the agricultural industry, and to augment the supply of trained research scientists.

The final support provided by the CDA Operating Grants program for the 3-year period of operation is summarized in Table 2.7.a.5. Appendix 8 shows a regional and discipline summary and list of projects for the fiscal year 1968-69.

Table 2.7.a.5. CDA Operating Grants Summary

	1966-67	1967-68	1968-69
Funds requested	\$ 1,172,211	\$1,128,580	\$1,826,727
No. of Applications rec'd	115	168	229
Average request	\$ 7,562	\$ 6,718	\$ 7,977
Funds allocated	\$ 304,000	\$ 479,970	\$ 650,000
No. of projects supported	71	110	144
Average support	\$ 4,282	\$ 4,363	\$ 4,514

The CDA Operating Grants are patterned on the National Research Council scheme as described on pages 7-13 of the NRC booklet "Awards to University Staff". The two systems are identical in such general aspects as eligibility, permissible uses of grant money, rates of pay for persons employed on grant-supported projects, and patent privileges. Whereas NRC puts major emphasis on its policy of "complete non-interference in university research programs" and on judging applications for grants "largely on the basis of an assessment of the scientific record of the applicant", CDA attaches somewhat less significance to these features and puts greater emphasis on the individual project, particularly with respect to its combination of merits for research and for student training. However, excellence in performance will always be a requirement for continuing grant support.

The purpose of the CDA Operating Grants is to increase the volume of high quality agricultural research in Canadian universities; to increase the number of well-trained agricultural scientists, particularly of the type most needed in Canada; and to complement, rather than duplicate or replace, the NRC grants program. To qualify for CDA assistance, a project must have definite implications of value to the agricultural industry. The term "agriculture" is to be interpreted broadly. Projects may range from the "mainly theoretical to distinctly practical" from intensive "individual" studies to extensive "team" programs. Special merit is attached to proposals in fields where new knowledge is urgently required and where the supply of trained investigators is seriously short.

In evaluating proposals for CDA Operating Grants, projects are assessed on the likelihood of advancing knowledge in an important field, the degree of fit with other research in course or contemplated in Canada or elsewhere, and the proposed student participation. Consideration is also given to the demonstrated competence of the principal investigator, the research reputation and the resources of his institution required to undertake the proposed study. Equitable distribution of awards among universities, subject fields, and disciplines are also taken into account.

The selection committee for CDA Operating Grants is appointed by the Deputy Minister of Agriculture and is composed of two members from the universities, two members from CDA, one member from the NRC Agriculture and Forestry Committee (ex officio), and a Chairman and Secretary provided by CDA. The Chairman reports to the Assistant Deputy Minister (Research), CDA.

CDA makes no research grants to industry but does maintain a consultative function in industrial grants made by other federal agencies.

2.7.a.6. Technical Changes vs. Research Program Changes

Changes in agricultural production methods, in storage and processing, in market requirements, in industrial organization, etc., have and can be expected to occur with increasing frequency.

Vertical integration of the poultry industry has resulted in changes in feeding, housing and marketing methods. The poultry breeding program for greater economic productivity to meet these changes has been taken over by a relative few large private breeders with corresponding reduction in government programs.

The development of herbicides has made cultivation for weed control unnecessary but has created new management and machinery problems.

Animal housing improvements, whereby more animals can be housed per unit space, have created new problems of crowding behaviour, nutritional requirements, and engineering.

In certain areas where reduction of summer fallow is becoming the practice, the use of fertilizers becomes necessary.

The possibility of adaptation of biological control methods for insect pests, such as the male sterile technique in control of codling moth, may dramatically alter chemical control programs.

Changes in cereal grain varieties and market demands may be expected to create new problems and corresponding changes in research programs.

Advances and modifications of research equipment may permit reallocation of research resources and adjustment in research programs.

Whether these changes can be anticipated or not, sooner or later program planning will have to cope with the problem of new research demands. Program changes may require reallotment of funds and of physical and human resources. Adjustment of fund allotments can usually be made because of flexibility of annual budgets. It is sometimes possible to shift resources by closing out research establishments or reducing them to satellite status but difficulties of staff relocation and political resistance are frequently encountered. But perhaps the greatest difficulty derives from the changing specialist requirements which can usually be met only by recruitment of new staff or, less often, by moving staff from one location to another.

As with any new research project or program decisions, changes in program will be dealt with as described under 2.7.a.1 and 2.

2.7.a.7 Transfer of Research Results to Users

A research project cannot be regarded as completed until the results have been published in a scientific journal and thus made available to others for development, extension or application. The extent of CDA research publication is indicated in section 2.8.2.

While the responsibility in the field of extension of the results of research to the ultimate user lies primarily with the provincial authority, most provinces have not or cannot meet their obligation. Even those provinces with the most highly developed extension services have not adequately exploited the technological advances provided by research. It is this gap between research and application that has created the major obstacle to technological innovation in Canadian agriculture. In an effort to close this gap and in recognition of its responsibility to the farmers of this country, CDA diverts a considerable portion of its effort and funds to the extension activity.

The Information Division of the Department of Agriculture plays a major role in transferring research results to industry (both primary and secondary), other government agencies, universities and the general public. The Division gathers and disseminates information on the total program of the Department, both scientific and regulatory, but it is estimated that 65 to 80 per cent of its effort is expended on the results of research and development work. The Division employs 36 information specialists and its budget for 1968-69 is \$1,150,000.

Results are transmitted through radio, television, farm press, daily press, periodicals, non-periodical publications, exhibits and through the Agricultural Representative Services maintained by the provinces.

Approximately 350 short radio programs (200 English, 150 French) are prepared annually and sent weekly to 139 English and 42 French language radio stations. Radio tapes are prepared at the Central Experimental Farm, Ottawa and mailed to co-operating radio stations. The Division also has land-line connections with the CBC for direct transmission to all affiliated stations. Almost all farm homes are equipped with radio.

Forty-five television films have been produced on research subjects in the five years 1963-67. Reproductions are forwarded by mail to 13 French and 34 English television stations. These films averaging 5-6 minutes in length

are incorporated in locally produced agricultural programs. Almost 80 per cent of Canadian farm households are equipped with television.

Press releases are prepared to report significant new developments. In the past five years, 1,103 press releases have been distributed to 101 daily newspapers, 834 weeklies and farm magazines, 279 radio stations, 64 television stations and 464 provincial extension personnel. In 1963 approximately 75 per cent of press releases were translated, in 1967 all releases were prepared in both languages.

There are approximately 75 weekly and monthly magazines devoted entirely to the farming industry. About 97 per cent of Canadian farmers receive at least one of these and a substantial number of farmers subscribe to ten or more farm papers. Daily newspapers are also a significant source of farming news for the rural population.

Service is also provided to the farm press in the preparation of feature articles.

The Information Division distributes non-periodical publications by mailing list and on request. Approximately 4,000,000 extension publications describing the methods of applying research have been distributed in the past five years. Large quantities are supplied to provincial Agricultural Extension Services for distribution. Publications are frequently mentioned in the farm press, are promoted at displays, country elevators, etc.

In addition three periodicals are prepared and distributed. The Farm Letter is published monthly and mailed to 420,000 farmers. About 50 per cent of the issues deal with research and the remainder with policy and programs.

The quarterly "Canada Agriculture" describes research currently in progress and is directed to Agricultural Representatives and agri-business. About 200 reports have been published in the five-year period 1963-67.

The quarterly magazine "The Lighter" serves the tobacco industry on an international scale. Normally one research article per issue is included. The current mailing list contains in excess of 1,600 names.

Exhibits are designed for and displayed at country fairs, plowing matches, etc. In the past five years, 115 exhibits have been prepared, 20 of which were devoted specifically to research. In 1968 a 50-foot trailer was purchased and fitted out for exhibition purposes. The display was open to the public for a total of 54 days in five western cities, the Central Canada Exhibition and the International Plowing Match.

2.8. Research Output

2.8.1. Patents and Licenses

Only rarely do the results of agricultural research lend themselves to the patent process. Furthermore, it is questionable whether the results of governmental research undertaken with public funds in the interests of the farming population should be patented unless there is some advantage to be gained in subsequent development of the product or process to expedite its adoption in use.

It is frequently in the public interest to circumscribe restrictive patents, as was the case with the process for dehydrated potato flakes. A patented process developed in the Food Research Institute broke the effective monopoly held in Canada and allowed three Canadian firms to initiate production. Four Canadian and two foreign firms are currently licensed. Production of dehydrated flakes under this patent amounted to 10 million pounds in the past five years.

New Varieties

Essentially there are only two ways in which productivity of agricultural crops can be improved by research: 1) by improved management practices, and 2) by improved genetic material, crops or animals, provided to the growers.

Crop plants are generally much more specific in their environmental requirements than animals. Their ability to grow, mature and overwinter are often narrowly limited by regional conditions of soil, moisture, light and temperature. To meet these restrictive regional conditions, the breeding of many new varieties has sought to incorporate the genetic characteristics, often derived from related species and varieties from all parts of the world, which will confer maximum advantage in any given region.

The new variety may be bred for increased yield or quality which are reflections of its suitability to the various physical factors of its environment. It may be bred to resist unfavourable biological factors, such as pest species, which continually threaten the survival of the crop. It may be bred in response to changing technological developments, changing economic factors, or changing consumer preferences.

The breeding of new varieties is not simply a matter of chance hybridization and selection. It must be based upon the knowledge derived from research of all factors of the environment, as well as on the inherent genetic composition of the species and the factors controlling genetic variation and

sexual compatibility. The actual breeding takes many generations of hybridization, genetic stabilization, selection and testing before a variety can be released. It must conform to grading standards. Even when all these conditions have been satisfied, there still remains the problem of making known to the grower the advantages of the new variety over existing varieties and supplying him with propagative material. Thus, the monetary advantages provided by a new variety may not become evident for several years after it is licensed.

The Research Branch has during the past 10 years produced through its research programs many new varieties which have not only given improved returns over previously grown varieties, but have made it possible to grow crops which could not otherwise be grown. The new varieties developed by CDA are listed in Table 2.8.1.

In total, over 150 varieties are listed in Table 2.8.1 but monetary advantages over previously grown varieties are only computed for a few of these newer varieties. These estimates are sufficient to indicate the actual and potential increased return to Canadian agriculture, sufficient to satisfy the most ardent cost-benefit analyst. One need only consider the well-known example of the rust resistant bread wheat varieties bred at Winnipeg for the Canadian Prairies. Without these resistant varieties it would not have been possible to grow wheat in the rust area of Manitoba and eastern Saskatchewan. The increased return to Canadian farmers from the use of the resistant wheat varieties in this area over the older susceptible variety, Marquis, has been calculated to be \$185 million annually.

Table 2.8.1. Some Important New Varieties Produced by Canada Department of Agriculture, Currently Grown

CROP	VARIETY	YEAR LICENSED	RES. STA.	ADVANTAGES	ECONOMIC RETURN
WHEAT (spring)	Selkirk	1953	Winnipeg	Rust resistant Man. & e. Sask.	\$3.9 million/yr. increase cf. mod. susceptible var. Thatcher or \$185 million/yr. increase (cf. highly susceptible var. Marquis.
	Pembina	1959	Winnipeg	To replace Selkirk, now susceptible	
	Canthatch	1959	Winnipeg	To replace Selkirk, now susceptible	
	Manitou	1965	Winnipeg	To replace Selkirk, now susceptible	
	Park	1963	Lacombe	Early maturing to escape frost - central and n. Alta.	\$500,000 per year increase
	Cypress	1963	Lethbridge	Sawfly resistant	
WHEAT (winter)	Talbot	1962	Ottawa	Lodging resistance: yield	
	Winalta	1961	Lethbridge	Earlier; shatter resistant; short straw; quality	
OATS	Fundy	1957	Fredericton		
	Cabot	1967	Charlottetown	Early: yield	
	Russel	1960	Ottawa		
	Stormont	1965	Ottawa	Lodging resistant	
	Fraser	1967	Agassiz		
	Harmon	1965	Winnipeg	Rust resistant: yield	In 1968, increased return \$1.6 million; cf. suscept. vars. would show increase of \$10 million
	Kelsey	1967	Winnipeg	Rust resistant: yield	
	Sioux	1967	Winnipeg	Rust resistant: yield	

Table 2.8.1. continued

CROP	VARIETY	YR. LICENSED	RES. STATION	ADVANTAGES	ECONOMIC GAIN
OAT	Fraser	1967	Agassiz	B.C. and blk. soils of Sask. & Alta	
BARLEY	Keystone	1962	Brandon	Feed: smut-resist: yield	\$1.74 million/yr. increase
	Conquest	1965	Brandon	Malting: straw strength: disease: yield	\$10 million/yr. increase
	Paragon	1968	Brandon	Malting straw strength disease: -- yield	
	Palliser	1960	Lethbridge	-----	\$700,000/yr. increase
	Betzes	1960	Lethbridge	-----	\$1.3 million/yr. increase
FALL RYE	Galt	1966	Lethbridge	-----	\$1 million increase in 1967
	Frontier	1964	Swift Current	Yield: Kernel size, color	10% increase
Ryegrass	Sawki	1963	Swift Current	Yield: curing: high protein (5% more forage: 10% more seed)	
Tall Wheatgrass	Orbit	1966	Swift Current	Winter hardy: saline soil	
Creeping Red Fescue	Boreal	1966	Beaverlodge	Yield: seed: export standard	
Bromegrass	Carlton	1961	Saskatoon	Hay (5-10% incr.) seed (25% incr.)	\$250,000/yr. increase for hay
Bromegrass	Magna	1968	Saskatoon	Hay (15% incr.): seed (30% incr.)	
Bromegrass	Redpatch	1964	Ottawa	Eastern	
Alfalfa	Beaver	1961	Saskatoon	Winter hardy: disease: yield 7-8% incr.	\$ 1 million/yr. incr. in Alta. irrigated area
Alfalfa	Rambler	1955	Lethbridge	Winter hardy: drought tolerant	
Alfalfa	Roamer	1966	Swift Current	Winter hardy: drought tolerant	\$7.5 million/yr. increase
Alsike	Aurora	1966	Beaverlodge	Yield: uniformity: vigour	

Table 2.8.1. continued

CROP	VARIETY	YEAR LICENSED	RESEARCH STATION	ADVANTAGES	ECONOMIC GAIN
Orchardgrass Timothy Timothy	Rideau Bounty Champ	1963 1966 1967	Ottawa Ottawa Ottawa	Eastern Eastern	
Soybeans Soybeans	Merit Harosoy Harosoy 63	1959 1953 1963	Ottawa Harrow U.S. license	Northern limit Disease	
Rapeseed Rapeseed Turnip rape	Nugget Oro Echo	1961 1968 1964	Saskatoon Saskatoon Saskatoon	Early: oil yield Oil quality Yield	\$3.5 million/yr. incr.
Flax Flax	Noralta Cree	1965 1961	Beaverlodge Morden	Yield: early maturity: rust resis. Failed because of new rust race	\$6 million/yr. incr.
Sunflower Sunflower Sunflower Sunflower Sunflower Grain Corn Grain Corn	Advent Admiral Commander Armavirec Valley Morden 88 Morden 67 13 hybrids	1959 1960 1964 1966 1968 1960 1966	Morden Morden Morden Morden Morden Morden Morden Ottawa	Early: rust resist. Early: rust resist. Large seed Early: oil Rust: oil yield Early hybrid Early hybrid: yield 8% higher Expanded corn production to shorter season areas and almost doubled grain corn acreage, 1961-66.	\$20,000/yr. incr. \$56,000/yr. incr. \$18,000/yr. incr. \$51,000/yr. incr.

Table 2.8.1. continued

CROP	VARIETY	YEAR LICENSED	RESEARCH STATION	ADVANTAGES	ECONOMIC GAIN
Tobacco	Ottawa 705	1965	Ottawa	Cigar filler: low nicotine - alkaloids: disease	
Tobacco	Delcrest 66	1966	Delhi	Flue-cured: yield: quality: disease: weatherfleck	\$850,000/yr. incr.
Tobacco	Yellow Gold	1961	Delhi	Disease tolerance	\$500,000/yr. incr.
Potato	Avon	1958	Fredericton		
	Fundy	1958	Fredericton		
	Hunter	1961	Fredericton		
	Sable	1964	Fredericton		
	Chinook	1964	Fredericton		
	Grand Falls	1965	Fredericton		
	Cariboo	1967	Fredericton		
Tomato	Scotia	1960	Kentville		
	Trent	1967	Smithfield		
	Rideau	1962	Ottawa		
	Starfire	1962	Brandon		
	Rocket	1966	Lacombe		
	Summerdawn	1962	Summerland		
Peas	Century	1960	Ottawa	Field pea: yield	\$500,000/yr. incr.
	Supersweet	1965	Brandon	Freezing and canning	
	Earligrreen	1960	Morden	Dwarf garden pea	
	Kemblue	1964	Kentville		

Table 2.8.1 continued

CROP	VARIETY	YEAR LICENSED	RESEARCH STATION	REMARKS
Eggplant Cabbage Cabbage Cabbage Sweet Corn Rutabaga	Early Midget	1960	Morden	Early
	Pee Wee	1966	Morden	
	Little Leaguer	1966	Morden	
	Junior	1966	Morden	
	Gardentreat	1966	Ottawa	
	York	1963	Charlottetown	
Apple	Quinte	1964	Ottawa	Accepted in last 10 years: Present value \$3 million
	Ranger	1964	Ottawa	
	Caravel	1964	Ottawa	
	Goodland	1960	Morden	
	Carroll	1961	Morden	
	Collet	1961	Morden	
	Garland	1961	Morden	
	Spartan	1936	Summerland	
Peach	Harrow Blood	1967	Harrow	Rootstock: dwarfing: tolerance to peach borer Rootstock: semi-dwarfing: tol. to perennial canker Winter hardy: quality: early Winter hardy: quality: early Winter hardy: quality: freestone
	Siberian	1967	Harrow	
	Harbinger	1968	Harrow	
	Harbelle	1968	Harrow	
	Harmony	1968	Harrow	
Strawberry	Cavallier	1957	Ottawa	Winter hardy: disease resistant
	Grenadier	1957	Ottawa	
	Guardsman	1957	Ottawa	
	Redcoat	1957	Ottawa	
	Protem	1964	Beaverlodge	
	Cheam	1968	Agassiz	
	Acadia	1964	Kentville	

Table 2.8.1 continued

CROP	VARIETY	YEAR LICENSED	RESEARCH STATION	REMARKS
Raspberry	Matsqui Boyne Killarney Avon	1968 1960 1966 1967	Agassiz Morden Morden Kentville	
Crabapple	Garry	1962	Morden	
Crataegus	Selkirk	1962	Morden	
Philadelphus	Snowbird	1968	Morden	
	Marjorie	1962	Morden	
	Audrey	1962	Morden	
Lilac	Miss Canada	1967	Morden	
Weigela	Centennial	1967	Morden	
Heuchera	Brandon Pink	1964	Brandon	
Aster	Cupid	1960	Morden	
Aster	Fay	1960	Morden	
Roses	2 vars.	1962, 1967	Brandon	
Roses	3 vars.	1960	Morden	
Monarda	4 vars.	1965	Brandon	
Chrysanthemum	24 vars.	1960-67	Morden	
Chrysanthemum	5 vars.	1967-68	Brandon	
Chrysanthemum	27 vars.	1960-67	Lethbridge	
Chrysanthemum	13 vars.	1964	Ottawa, P.R.I.	

2.8.2. Journal Articles

To the research scientist, publication of the results of his research in internationally distributed journals of high scientific repute is the means of communication with his colleagues and recognition by the scientific community most highly prized. It exposes his efforts to the critical examination of his peers and upon their decision his reputation depends. It provides the most effective means of rapid and widespread dissemination of information from which the research of others can progress, from which developmental research can proceed, and from which extension publication can be derived. It is the product of his research and the measure of his productivity.

With over 800 scientific publications a year, one can at least get some concept of the magnitude and vigour of the research effort of the Department (Table 2.8.2.). It is fully appreciated that the number of publications alone is no real measure of the quality of research performed. It is obvious that the list will contain papers ranging from the very trivial to the most profound contributions. And while it is not possible to evaluate each paper, a task that is performed annually in the assessment of each research officer for merit increase, it must be remembered that the least of them is of sufficient importance in its contribution to be acceptable to a discriminating editorial staff of reviewers.

In addition to scientific publications, over 360 miscellaneous publications are prepared each year by the research staff of the Department, ranging from extension publications and special reports to comprehensive review papers and technical books. While a complete listing is not possible, a partial list of those still available for distribution is contained in Appendix 9 - "List of Publications, Canada Department of Agriculture, 1968".

Table 2.8.2 Number of Publications Canada Department Agriculture Research Units, 1963-1967

Establishment	Scientific Journals					Total	Miscellaneous Publications					Total
	1963	1964	1965	1966	1967		1963	1964	1965	1966	1967	
Agassiz	4	11	6	12	15	48	6	17	26	12	22	83
Kamloops	4	11	8	5	10	38	2	6	3	4	6	21
Saanichton	7	1	8	3	5	24	0	1	1	1	1	4
Summerland	24	27	15	30	28	124	30	30	30	30	30	150
Vancouver	20	22	12	22	20	96	8	12	2	2	4	28
Beaverlodge	6	5	7	6	7	31	2	4	11	6	7	30
Lacombe	15	6	8	7	14	50	9	20	8	11	10	58
Lethbridge	59	57	46	55	54	271	8	5	7	15	19	54
Indian Head	-	-	-	-	-	-	2	2	2	2	2	10
Melfort	5	3	1	1	1	11	1	6	5	12	0	24
Regina	2	4	3	3	8	20	1	5	3	5	1	15
Saskatoon	37	31	28	32	37	165	22	21	33	43	30	149
Swift Current	30	30	18	26	33	137	10	12	6	9	7	44
Brandon	16	9	16	8	6	55	2	6	4	8	1	21
Morden	8	9	4	5	7	33	7	8	8	14	10	47
Winnipeg	42	33	29	48	44	196	13	16	14	13	5	61
Chatham	10	18	11	9	-	48	7	7	4	2	-	20
Delhi	6	4	8	10	4	32	4	4	4	4	4	20
Harrow	21	17	14	14	35	101	5	13	7	5	3	33
Ottawa R.S.	14	22	17	33	18	104	22	21	4	27	17	91
Vineland	15	18	19	15	24	91	2	2	2	15	8	29
Smithfield	1	3	1	0	3	8	0	2	3	1	4	10

Table 2.8.2. continued

Establishment	Scientific Journals					Miscellaneous Publications						
	1963	1964	1965	1966	1967	Total	1963	1964	1965	1966	1967	Total
La Pocatiere	8	5	7	5	2	27	10	16	2	8	0	36
L'Assomption	3	3	2	3	0	11	1	1	0	1	0	3
Lennoxville	2	1	7	4	5	19	-	-	-	-	-	-
St. Jean	19	11	13	6	16	65	2	2	3	2	0	9
Fredericton	16	39	22	25	21	123	10	8	3	9	6	36
Kentville	28	42	28	31	36	165	22	26	27	40	26	141
Charlottetown	12	18	13	15	19	77	8	10	2	2	6	28
St. John's W.	5	5	2	2	4	18	6	1	5	3	1	16
Belleville R.I.	35	34	34	44	45	192	13	13	17	6	7	56
London R.I.	19	32	21	30	25	127	7	5	4	3	2	21
Animal R.I.	37	32	25	20	28	142	1	4	1	1	3	10
Entomology R.I.	57	57	60	69	63	305	7	2	9	10	0	28
Cell Biology R.I.	19	18	17	13	39	106	3	3	3	4	4	17
Plant R.I.	48	48	48	48	48	240	18	18	18	18	18	90
Soil R.I.	28	34	32	40	52	186	1	4	2	5	13	25
Food R.I.	6	14	12	14	14	60	5	0	1	2	5	13
Engineering R.S.	18	17	7	16	16	74	6	11	5	10	10	42
Statistical R.S.	-	-	5	5	10	22	-	-	-	-	-	-
Analytical Chem.	8	11	12	10	15	56	0	2	0	2	2	6
Research Branch	714	761	646	746	831	3698	283	346	289	367	294	1579
Grain Res. Lab.	10	12	9	12	6	49	15	21	15	19	23	93
Animal Dis. R.I.	34	37	30	15	33	149	-	-	-	-	-	-
Economics Br.	56	67	47	66	78	314	36	27	29	23	26	141
Total	814	877	732	839	948	4210	334	394	333	409	343	1813

2.8.3. Reports

Reference has been made to reports issued by CDA in Section 2.8.2. However, special mention may be made of the Research Reports prepared by each establishment of the Research Branch to cover their activities usually for the preceding one-to two-year period. A sample copy of these Research Reports, arbitrarily selected for the Vancouver Research Station, will be found as Appendix 10. Commencing in 1968, research reports of the Research Branch establishments will be consolidated in one report and issued annually.

The Grain Research Laboratory is responsible for the publication of a number of reports, including the Canadian Wheat Bulletin, Canadian Barley Crop Bulletin, Canadian Flax and Rapeseed Crop Bulletin, Canadian Wheat Cargoes, Canadian Durum Cargoes, Map of Protein of Canadian Hard Red Spring Wheat. An annual report covering the activities of the Grain Research Laboratory is issued separately.

In addition to its contributions to scientific journals, the Economics Branch publishes "Agriculture Abroad" which contains agricultural economics information and analyses on a global basis. Research reports on Canadian agricultural economics are also prepared by the Economics Branch and distributed by the Department. Staff of the Economics Branch also produce a substantial number of significant unpublished articles for internal use each year.

2.8.4. Conferences

The presentation of scientific papers and participation in seminars and discussion groups at scientific conferences provide an important means of communication of research results and of research in progress as well as the informal exchange of ideas.

Since 1959, the Treasury Board has imposed a maximum dollar amount to control the extent of participation by Agriculture employees in scientific meetings and out-service training courses. This annual quota is usually a little less than six per cent of the total provision of funds for travelling and removal expenses. It provides an average expenditure of just over \$150 per professional officer in the Research Branch. The actual quotas authorized by the Treasury Board for the past seven fiscal years have been as follows:

1962-63	\$ 157,000
1963-64	150,000
1964-65	165,000
1965-66	170,000
1966-67	202,680
1967-68	240,154
1968-69	220,000

Despite the financial limitations on conference attendance, CDA scientists have made a notable contribution to national and international conferences. Their election to high executive positions, particularly in international organizations, is evidence of the high reputation of their research and organizational contributions.

2.8.5. Transfer of Foreign Scientific Information

Scientific journal publications prepared by CDA staff invariably contain world literature references pertinent to the subject of the paper. Special subject review papers are also published; such as those in the reviews published by Annual Reviews Inc., a series covering twelve science areas.

A number of 'in-house' mimeographed publications, such as "Pesticide Progress", contain summaries of important advances made in foreign countries. These publications, while primarily intended for CDA information, do have wide extramural distribution in Canada.

CDA maintains a number of information centres which assemble and classify world information and which is made available to extramural agencies in Canada, including industry, e.g. Pesticide Technical Information Office, Food Technology Information Office, Engineering Services.

CDA Departmental Library is available to any extramural requests for world information and inter-library loans are routinely made.

Communications received from international organizations, in which Canadian participation is assigned to CDA, are transmitted to interested extramural agencies, e.g. FAO, OECD reports.

Commonwealth Agricultural Bureaux (See Section 2.1.d)

These are a group of organizations financed by British Commonwealth countries, together with the Republics of Ireland and the Sudan, and operating under an Executive Council of representatives of all contributing countries. The principal function of the Bureaux is the maintenance of a world-wide agricultural abstracting service, together with the publication of fourteen, and support of four additional, abstracting journals. The Commonwealth Institute of Biological Control, located in Trinidad, collects and distributes parasites of destructive plants and insects.

During each year the fourteen C.A.B. abstracting journals publish in excess of 50,000 abstracts and titles selected from more than 10,000 periodicals and publications in all languages. Requests for information in excess of 1,000 different subjects are handled annually, and research workers are

supplied annually with more than 6,000 items of literature, translations, micro-films, etc. Special monographs, books and other publications are printed each year, some of these written by staff members, and each one providing the latest information on research techniques in its own field.

Canadian institutions are unable to purchase or subscribe to all of the journals numbering more than 10,000 which are abstracted by C.A.B. workers, and are also unable to provide translations of all work in foreign languages. Many of these journals are foreign language publications, which would require translation services. Students and research workers must be provided with abstracting journals or it would be necessary to provide a similar organization to secure this required research information. If each member of the Commonwealth were to duplicate this effort, the overall costs would be much greater. By cooperating financially and maintaining the actual services in Great Britain, the cost to Commonwealth countries is minimized.

2.8.6. Important Alumni of CDA

Research Branch. The Research Branch has been a favoured recruitment source for both Canadian and U.S. university staff. Although a record of those who have left to join U.S. universities has not been kept, the list below shows the substantial contribution made to Canadian universities. The list includes only those currently active.

Special mention may be made of Dr. Robert Glen, formerly Assistant Deputy Minister (Research), who recently resigned to accept the position in the U.K. of Secretary, Commonwealth Scientific Committee.

2.8.6.

Research Branch Staff Now On The Staffs Of Canadian Universities

<u>U. of British Columbia</u>	<u>U. of Alberta</u>	<u>Simon Fraser Univ.</u>
Dr. C.O. Person	Dr. W.P. Skoropad	Dr. B.P. Beirne
	Dr. N. Colotelo	Dr. P. Belton
	Dr. G.R. Webster	Dr. J.M. Webster
<u>U. of Saskatchewan</u>	Dr. F.D. Cook	Mrs. T. Finlayson
Dr. S.H. Nelson	Dr. G. Armstrong	Dr. J.S. Barlow
Mr. D. Dabbs	Dr. N.B. Madsen	Dr. J.P.M. Mackauer
Dr. E.A. Maginnes	<u>U. of Manitoba</u>	Dr. K.K. Nair
Dr. H.H. Nicholson	Dr. R.C. McGinnis	Dr. A.L. Turnbull
Dr. B.D. Owen	Dr. A.G. Robinson	<u>Victoria University</u>
Mr. J.B. O'Neil	Dr. J.D. Campbell	Dr. D.J. Ballantyne
Mr. R.Y. Zacharuk	Dr. W.G. Barker	<u>Queen's University</u>
Dr. W.J. White	Dr. H.E. Welch	
Mr. A. Wenhardt	Dr. M.A. Zwarich	Dr. B.N. Smallman
<u>U. of Guelph</u>	Dr. G.E. Laliberte	Dr. A.E.R. Downe
Dr. E.G. Beauchamp	Dr. J.A. Anderson	
Mr. D.W. Hoffman	<u>U. of Western Ontario</u>	<u>Waterloo University</u>
Dr. G.H. Bowman	Dr. B.G. Cumming	Dr. B. Kendrick
Dr. B.H. MacNeill	Dr. W.E. McKeen	
Dr. N.R. Richards	Dr. E.H. Colhoun	<u>Windsor University</u>
Dr. K. Kasha	Mr. J.A. George	Dr. W.G. Benedict
Dr. F.E. Chase	<u>U. of Toronto</u>	<u>McMaster University</u>
Dr. W.H. Wilde	Dr. D.A. Chant	Dr. I. Takahashi
Dr. R. Protz	Dr. Z.E. Patrick	<u>McGill University</u>
<u>Trent University</u>	Dr. D.G. Friend	Dr. L. Wolfe
Dr. R.L. Edwards	<u>Macdonald College, McGill U.</u>	<u>Mount Allison University</u>
<u>Carleton University</u>	Dr. W.E. Sackston	Dr. P. Chandra
Dr. P.E. Lee	Dr. J.F.G. Millette	<u>Memorial University</u>
Dr. C.A. Barlow	Dr. J.M. Ingram	Dr. O.A. Olsen
Dr. V.N. Iyer	Dr. N.C. Lawson	
<u>U. of Montreal</u>	<u>University of Sherbrooke</u>	
Dr. J.L. Auclair	Dr. J. Juillet	
<u>Université de Laval</u>		
Dr. J.E. Chevette		
Dr. G. Brisson		
Dr. P. Gervais		
Dr. R.O. Lachance		
Dr. P. Lupien		
Dr. W. Holtmann		
Mr. J.P. Lemay		
Mr. L. Cinq-Mars		
Mr. F. Gauthier		
Mr. J.P. Julien		
Dr. R.A. Lachance		
Dr. H.R. Therrien		
Dr. M. Lepage		
Dr. G. Ouellette		
Dr. R. Riel		
Dr. S. Bourget		
Mr. R. Baril		
Mr. G. Provencher		
<u>U. of New Brunswick</u>		
Dr. O.T. Page		
Dr. L.A. Dionne		

Economics Branch

(a) Senior federal government officers

- (1) C.V. Parker, Director, Agriculture Division, D.B.S.
- (2) W. Porter, Director, Census Division, D.B.S.
- (3) L. Poetschke, Director, Policies and Planning, ARDA
- (4) J.A. Dawson, Economic Council of Canada
- (5) D. Laughton, Director, Agriculture & Fisheries Branch,
Department of Trade and Commerce
- (6) Roger Perrault, Chairman, Canadian Livestock Feed Board

(b) Senior provincial government officers

- (1) C.H. Chisholm, Minister of Agriculture, Nova Scotia
- (2) A.H. Turner, Deputy Minister of Agriculture, British
Columbia
- (3) B.H. Kristjanson, Deputy Minister, Economic Development,
Manitoba
- (4) H.L. Patterson, Director, Farm Economics, Statistics and
Co-operatives Branch, Ontario Department of
Agriculture and Food
- (5) L.B. Kristjanson, formerly Assistant Deputy Minister,
Manitoba Department of Agriculture and now with FAO

(c) In universities

- (1) H. Harries, M.P., Dean of the School of Commerce,
University of Alberta
- (2) H.C. Abell, Ph.D., formerly Professor of Sociology,
Ontario Agricultural College, now with University
of Waterloo
- (3) W.G. Gainer, Ph.D., Department of Political Economy,
University of Alberta
- (4) C.B. Haver, Associate Professor, Macdonald College
of McGill University
- (5) P.J. Thair, Ph.D., Associate Professor, Department of
Agricultural Economics, University of Saskatchewan
- (6) R.C. Nicholson, Ph.D., Assistant Professor, Department
of Agricultural Economics, University of Saskatchewan
- (7) S.D. Staniforth, Ph.D., Professor of Agricultural
Economics, University of Wisconsin

(d) In business

- K. Leckie, General Manager, Meat Packers Council of
Canada
- J.W. Clarke, former President, Winnipeg Grain Exchange,
now with Hedlin-Menzies (consultant firm)

(e) Others

- W.J. Anderson, former Director of Research, Agricultural
Economics Research Council of Canada, now with Harvard
Institute of International Affairs
- R.G. Knowles, former Director, Farm Broadcast Series, CBC,
now with FAO.

Grain Research Laboratory

Dr. W. Bushuk, Professor of Plant Science, University of Manitoba.

Dr. C.C. Tsen, Amercian Institute of Baking, Chicago, Ill.

Dr. J.A. Clayton, Fisheries Research Board, Winnipeg, Manitoba.

Animal Pathology Division

Dr. D. McKercher, California

Dr. P. McKercher, Plum Island.

2.8.7. Research teams

There are many notable examples of outstanding groups which have made and are making important contributions to scientific knowledge as well as to the solution of practical agricultural problems. Among these might be mentioned the following teams:

- animal biochemistry in the Animal Research Institute
- animal nutrition in the Animal Research Institute
- poultry genetics in the Animal Research Institute
- insect systematics in the Entomology Research Institute
- microbial biochemistry in the Cell Biology Research Institute
- virus chemistry in the Vancouver Research Station
- virus-vector relations in the Cell Biology Research Institute
- integrated chemical and biological control of orchard insects at Kentville Research Station
- potato breeding program at Fredericton
- parasitic nematode studies at Vineland Research Station
- the tobacco research program at Delhi Research Station
- biological control of insect pests at the Belleville Research Institute
- taxonomic mycology and phanerogamic taxonomy in the Plant Research Institute
- cereal breeding for disease resistance at Winnipeg Research Station
- biochemical mechanisms of insecticide action at the London Research Institute.

The Working Committee, currently engaged in developing the Canadian Farm Management Data System (CANFARM) is considered to have both unique and valued abilities. This team, formed in 1965 and expanded since, is composed of representatives from universities and federal agencies.

The team works under the general guidance of the National Farm Management Committee which, in turn, is responsible to the Canadian Agricultural Services Coordinating Committee (see 2.1.b.).

Its uniqueness is in the combination of abilities rather than in the abilities of the individual team members. This team brings together the knowledge and expertise of experienced research economists, farm management specialists and computer experts in developing a national system of unprecedented potential to farmer, extension economist, research economist and policy-maker. (Economics Branch)

In recent years, Canada has made a significant contribution to international discussions, negotiations and the development of multilateral programs relating to agricultural trade and aid. The consistently high calibre of Canadian proposals and negotiating positions that have contributed to the establishment of the World Food Program, the General Agreement on Tariffs and Trade, the International Grains Agreement and Sugar Agreement, the successful contribution to and benefits from major negotiations such as the "Kennedy Round", various programs and policies of the U.N. Food and Agriculture Organization (FAO) and the Organization for Economic Co-operation and Development (OECD) and other international forums, have resulted from an interdepartmental team effort. A research program centered in the Marketing and Trade Services Division of the Economics Branch, has aimed at providing full factual information necessary for the development of Canadian positions under various contingencies which arise in the international field and the growth of a pool of expertise for Canadian delegations.

2.8.8. Equipment and methodology

Immuno-osmophoresis

A new technique has been developed for the rapid detection of plant viruses and is now used by U.S. Army Medical Corps for quick diagnosis of several tropical virus diseases in man.

Research in the field of plant virus infection and inhibition has led to a number of applications or good potentials for application. The technique which we devised and named immuno-osmophoresis, arose during the course of our research into the cytological consequences of virus infection, when we required a rapid and very sensitive method to detect extremely small amounts of virus even in crude tissue preparations. Although this method was at first applied only to the two or three viruses with which we were then working, we subsequently modified the technique so that it was universally applicable to all viruses, and, indeed, to all proteins. This technique has now been adopted as a routine method for diagnosis of certain human viruses in some medical laboratories, because of its quantitative accuracy, its simplicity and its rapidity in obtaining the results.

(Vancouver Research Station)

Controlled environment facilities

Engineering Research Service has been a world leader in the design of controlled environment facilities for plant growth studies. The extensive work done in this area has allowed several Canadian companies to start manufacture of these chambers and compete successfully on world markets.

(Engineering Research Service)

Insecticide residue determination

Development of sensitive and specific methods for determining residues of insecticides is a prerequisite to any studies on their persistence in soil and plant tissues or on their translocation from soil into various crops. Electron capture gas chromatographic methods have been developed at Saskatoon for determining residues of aldrin, heptachlor, α -chlordane, dieldrin and endrin in wheat and, with modifications, for other crops and soil. Extraction efficiencies are high so that the results are valid for interpretation of residue hazards.

(Saskatoon Research Station)

Microplot technique for screening insecticides

The development of mass rearing techniques for certain insects of economic importance together with the discovery of conditions controlling diapause resulted in a steady source of insects for laboratory evaluation of insecticides and finally the development of the microplot technique for the last step in screening insecticides. This has not only saved considerable manpower but also accelerated the final evaluation by a couple of years. Following the establishment of base line toxicity data the mapping of the development of resistance to specific insecticides by soil insects was possible. Using the above rearing and storing techniques sources of resistant and susceptible insects have been maintained. This service has enabled investigators to check on the development of resistance and thus warn of the need to switch to another insecticide.

(London Research Institute)

A fluorometric method of selenium analysis

Selenium has been categorized as an essential dietary trace element in higher animals and its role has been established in controlling, preventing and protecting animals against a wide spectrum of deficiency diseases. However, selenium is a very toxic element and this presents problems concerning its use to treat animals which will later be used for food. The presence of trace

amounts of selenium from natural sources in most foods and biological materials further complicates the problem of establishing the actual amounts added as a residue due to its therapeutic use.

A precise, accurate and convenient fluorometric method of analysis valid down to the nanogram range has been developed and tested by Analytical Chemistry Research Service of the Research Branch. The availability of this reliable procedure has stimulated various lines of research directed both to increasing basic knowledge regarding the role of selenium and to establishing the optimum benefits from its use.

(Analytical Chemistry Research Service)

Determination of arsenic residues

Work on arsenic methodology was necessary because of the continued use of arsenicals for agricultural purposes and the need to protect the export of Canadian products from unjustified exclusion on the basis of high residues. Conflicting claims regarding the actual levels of arsenic residues were resolved after the method of analysis developed by Analytical Chemistry Research Service of the Research Branch was established as Official, final action, through the A.O.A.C. This reliable method continues to serve as the universal basis for deriving authoritative data on arsenic residues in biological materials.

(Analytical Chemistry Research Service)

Analysis for winter-hardiness

Development of laboratory methods for component analysis of winter-hardiness in tree fruits: electrical impedance measurement of wood maturation; natural bioelectric and activated potential measurement to determine the depth of dormancy and pollen analytical methods to assess genetic differences in threshold temperature responses and growth efficiency under conditions of sub-optimal temperature.

(Harrow Research Station)

Steroid hormone identification

Precise techniques for the isolation and identification of steroid hormones have been developed. Approximately 50 different steroids have been isolated and characterized with respect to structure and isomerism. Mathematical equations have been developed to allow a prediction of unknown steroids from their retention times on capillary columns in gas liquid chromatography.

(Animal Research Institute)

Quantitative measurement of pest infestation on livestock

Distribution of bloodsucking flies on cattle have been found to conform to an exponential function when rates of infestation approach the steady state. This mathematical relation between numbers of animals and pests provides the first provisional scientific basis for a quantitative measurement of pest infestations on livestock. It has immediate application in an economic evaluation of pesticides and of methods of treatment for operational purposes in both animal production and in the agricultural chemical industry.

(Lethbridge Research Station)

Evaporation estimator

The balance between precipitation and evapotranspiration largely determines agricultural production potentials in Canada. Baier and Robertson developed a technique for estimating daily evaporation from standard climatic data. Evaporation can now be calculated for some 600 weather stations at which daily records of temperatures are maintained but no evaporation records are available.

(Plant Research Institute)

Ultrasonic measurement of soil moisture

The first breakthrough in the measurement of soil moisture by utilizing ultrasonic energy was made by Engineering Research Service recently. This and current work will result in an instrument for instantaneous field measurements for research or for farm management.

(Engineering Research Service)

Determination of milling and baking quality in wheat

The overall contribution of engineering to biological research has been the development of apparatus and techniques to increase the accuracy and efficiency of research. Several devices have been developed for improving the methods used to evaluate the quality of wheat flour in genetic research and production control. Preparation of milled test samples has been speeded up tenfold. New apparatus to measure the resilience, fermentation and mixing properties of dough have opened new avenues of research, speeded up testing and replaced subjective with objective measurements.

(Engineering Research Service)

Determination of egg shell strength

Extensive research into the strength of the hen's eggshell has brought several fundamental facts to light which have allowed a fuller understanding of the failure mechanism of the shell. This has led researchers at two

Canadian universities to take up work in this field. It is now possible to measure shell strength and thus provide the means for genetic and nutritional research in this area which should reduce the millions of dollars lost per year in cracked and broken eggs.

(Engineering Research Service)

Map of Plant Hardiness Zones

The farm value of woody ornamentals produced annually in Canada is about 4.5 million dollars and the total value sold is probably close to 10 million dollars. An important percentage of these plants (about 10%) are winter killed because they are not adapted to the regions where they are planted. A zonation map completed in 1967 by the Agrometeorology and Ornamental Plant Sections gives the suitability of the different regions of the country for the winter survival of ornamental trees and shrubs. The value of such a map cannot be measured in terms of dollars but nurserymen and garden journals have expressed their appreciation by using and publishing it extensively. If 10 per cent of the plants sold were selected on the basis of the map, we are talking about at least a million dollars per year.

(Plant Research Institute)

Tests for animal diseases

Complement fixation tests have been developed for bluetongue, toxoplasmosis, anaplasmosis, and African swine fever. Immune fluorescent tests for toxoplasmosis, rabies, African swine fever, hog cholera, bluetongue, bovine virus diarrhea have been established. A monitoring system for control of hatchery sanitation has been developed.

(Animal Disease Research Institute)

2.8.9. Examples of economic and scientific contributions

Reference has been made in Section 2.8.1. to the impact of the extensive breeding program in the development of new varieties on the agricultural economy.

Listed below are additional selected examples of CDA research contributions which have importance to the Canadian economy or to the advancement of scientific knowledge.

Certification of Canadian tobacco as Maleic Hydrazide free

The Ontario Flue-Cured Tobacco Growers' Marketing Board oppose the treatment of tobacco crops with the growth regulator, Maleic Hydrazide, (MH-30), in a sustained effort to enhance the price of Canadian tobaccos

and to increase the tonnage of Canadian tobacco exports which amounted to about 66 million pounds in 1967. In the absence of a valid laboratory method for the accurate determination of MH-30 residues, the Marketing Board considered abandoning its stand against use of this means of chemical suckering. At their request a specific, interference-free method of analysis was developed by Analytical Chemistry Research Service of the Research Branch and is now the established basis for enforcing The Farm Products Grades and Sales Act respecting the use of MH-30 on flue-cured tobacco.

Following a request by the Ontario Department of Agriculture and Food for further help in developing a rapid test which could be used to screen representative samples from the entire tobacco crop for MH-30 residues, such a method was perfected and demonstrated to the enforcement agency.

Because of the present resistance to the purchase of Rhodesian tobacco, Canada can expect to export 70 to 80 percent more tobacco especially by complying with the insistence of foreign purchasers for tobacco guaranteed free from residues of Maleic Hydrazide.

(Analytical Chemistry Research Services, Ottawa.)

Insect control in tobacco and vegetables

The development of the chemical control of seed maggots in tobacco has resulted in the elimination of the 15-20% loss formerly occurring in the \$100,000,000 tobacco crop. Seed treatment of field and vegetable crops by specific chemicals has resulted in perfect control of the insects which formerly had wiped out whole fields.

(London Research Institute)

Vacuum fumigation of foods

The effectiveness of vacuum fumigation of foodstuffs has been improved by the application of modified techniques developed as a result of research done in the Institute. Laboratory studies here have shown that the normal characteristic odour of the fumigant, phosphine, cannot be used as a measure of safety since it is preferentially absorbed by some material and thus makes the use of chemical indicators more important.

(London Research Institute)

Liming of acid soils

Research has shown use of adequate limestone for cereal and forage crops on acid podzols increases yield by as high as 100% and doubles the efficiency of fertilizer applied to these crops. It is estimated that yield increases

due to higher rates of liming and fertilization would amount to hundreds of thousands of dollars in the Maritime Provinces.

(Charlottetown Research Station)

Fertilizers for broccoli and Brussels sprouts

The nitrogen, phosphorus and potassium requirements of broccoli and Brussels sprouts have been described. This has resulted in more efficient fertilizer use and increased yields. The findings have international application so monetary evaluation is difficult to assess. It is estimated that the yield increase on 600 acres in P.E.I. alone would have a farm value of approximately \$30,000 annually.

(Charlottetown Research Station)

Chemical control of root maggots

Developing methods of applying insecticides for efficient control of root maggots attacking cruciferous crops has resulted in increased profits to farmers of \$300 to \$1,000 per acre. A machine was developed for applying insecticide and crucifer seeds at precise levels in the soil and commercial models of the machine are now in use in the Maritime Provinces and Northeastern U.S.

(Charlottetown Research Station)

Controlled atmosphere storage of apples

Development of a practical and cheap method for controlling CO₂ levels in storages through the use of a dry hydrated lime "scrubber". Approximately 75% of the CA storages in the United Kingdom use this system, and it is being adopted extensively in Holland, Belgium, USA as well as Canada. Recent studies of a CA storage which contained 288,000 bushels of apples showed this method of CO₂ control to be 6 cents per bushel cheaper than the previously recommended system. This amounts to a saving of at least \$120,000 per year in Canada.

(Kentville Research Station)

Transit injury to pears

Development of polyethylene lined boxes with hydrated lime inserts for prevention of CO₂ injury to pears in transit. This system was used in making the first shipments of fruit in bulk containers with controlled atmospheres. Apples were shipped to West Indies in 1960 and pears to the United Kingdom in 1963.

(Kentville Research Station)

Storage of hatching eggs

Several discoveries in the handling and methods of storing hatching eggs have been applied directly by the poultry industry. By rough calculations it is estimated that the application of these findings should represent a saving to the industry of at least one million dollars per annum.

(i) Discovered that enclosing the egg pack in sealed plastic film effectively improves hatchability if chicken eggs are held for two weeks or longer by inhibiting dehydration and release of CO_2 and thereby stabilizing the pH of the egg albumen resulting in a more tolerable environment for the dormant embryo.

(ii) Further research revealed that using a gas impermeable film and flushing with nitrogen gas to reduce the oxygen level to about 4% further extended the storage life of the dormant embryo.

(iii) Obtained evidence indicating that the most favourable egg storage atmosphere contains about 3-4% oxygen, low levels of carbon dioxide and about 96% nitrogen.

(iv) Developed a technique for sealing the fractured shells of eggs making them suitable for hatching purposes.

(v) Discovered that the orientation of the egg during storage was important for the realization of optimum hatchability with eggs packed in the small-end-up position hatching better than eggs packed in the "normal" small-end-down position with storage periods up to 4 weeks. An additional gain in the efficiency of handling hatching eggs in storage was achieved by eliminating the need for turning eggs during storage when this pack orientation is used.

(Kentville Research Station)

Control of bacterial ring rot of potatoes

Des travaux de recherches sur les moyens de contrôle du flétrissement bactérien de la pomme de terre ont démontré que l'élimination des planteurs à pic et l'usage des tubercules entiers comme semence préviendraient la dissémination de cette maladie, augmenteraient les rendements et offriraient une meilleure garantie à l'exportation. On poursuit l'étude du mécanisme de la résistance de certaines lignées ou variétés à cette maladie, ce qui devrait aider les généticiens dans le croisement des lignées résistantes.

(La Pocatière Research Station)

Fall-sown oats

Dormoats, a new class of oats, has been developed by transferring the seed dormancy of Avena fatua to the cultivated oat (A. sativa). When sown in the autumn, these oats remain dormant but viable over winter, germinate early in the spring, grow well in the cool moist conditions of May and June and ripen earlier than spring sown seed. Although low spring emergence is a problem that must be solved, Dormoats show great potential for minimizing the rust and Septoria problem (by means of their early maturity) and for raising the yield barrier (up to 25%).

(Ottawa Research Station)

Control of transit decay of strawberries

Cobalt 90 irradiation at dosages of 300,000 rads retarded fungal growth of fresh strawberries for periods of up to 4 weeks depending upon storage temperature. Tests indicated that this dosage increased shelf life by 18, 6, and 3 days at 40, 55 and 70°F respectively. Gamma radiation would thus permit long distance shipment of strawberries with significantly lower losses due to fungal breakdown and loss of quality.

(St. Jean Research Station)

Pest control of fruit and tobacco crops in Ontario

In the past ten years, we believe that the Vineland Research Station has saved the fruit industry in Ontario approximately \$1 million dollars per annum from the following phases of our research programs directed to chemical control of tree fruit pests:

- (i) Substitution of new pesticides in the annual recommendations, based on rapid-testing techniques developed here, to offset resistance of many insects to the earlier organic pesticides.
- (ii) Development of a system for continually monitoring the levels of resistance in orchard mites to a wide range of pesticides and the switching of materials in the annual recommendations to limit such resistance spreading.
- (iii) Adoption of new, improved fungicides for disease control into the complicated spray program.
- (iv) Research on spray deposits by different types of sprayers and nozzle arrangements show marked differences in type and amount of deposits. Growers can be shown how to reduce their insecticide costs by one-third to one-half through the proper adjustment of

nozzles and operation of their sprayers.

- (v) The development by our chemist of rapid, colorometric methods for the quantitative analysis of residues on foliage. This is a very useful tool for the rapid assessment in the field of the distribution and fate of pesticide deposits by various types of sprayers on different types of trees and on the rate of weathering of the deposits.
- (vi) The strawberry industry in Ontario is now saving approximately $\frac{1}{4}$ million dollars from research on the cause and control of "cat-facing".
- (vii) The cherry industry is now saving at least one-quarter of a million dollars per annum from research on control of cherry viruses.
- (viii) The development of chemical controls for plant parasitic nematodes in flue cured tobacco is now saving that industry at least \$3 million annually.
- (ix) The development of chemical controls for plant parasitic nematodes in a wide range of fruit, vegetable and horticultural crops in Ontario is now saving the horticultural industry at least \$1 million annually.

(Vineland Research Station)

Control of sugar beet insects

Research into control of insect pests on sugar beets has permitted farmers to harvest two to five tons more per acre in the Winnipeg area. With a price of \$15.00 per ton, and about 25,000 acres sown to beets per year, the annual increase in farm return from this work amounts to \$750,000.

(Winnipeg Research Station)

Control of stored grain insects

Research on the control of stored product insects permits effective control under Canadian conditions. Occasionally serious outbreaks do occur and are usually the result of not following recommendations. In periods of grain surpluses when large volumes of grain must be stored for several years under inadequate conditions losses to insects, mites, and molds can be and frequently are extensive. Even under these conditions, however, losses can be minimized if the control recommendations are followed. In this case it is impossible to place a dollar figure on the value of the research since research

has prevented the losses and we do not know the potential damage.

(Winnipeg Research Station)

Varietal resistance to flax rust

Race 309 of flax rust was discovered in 1963 virulent on the popular variety Marine, as well as Cree and Army. Resulting removal of these varieties from recommended list and change by growers to other varieties is estimated to have prevented losses of \$12,222,000. The discovery also caused major changes in flax breeding programs of Canada and U.S.

(Morden Research Station)

Weed control in cereal crops

In 1958, 12,000,000 acres of cereal crops on the prairies were sprayed with 2,4-D or MCPA. That was 12 years after the introduction of these herbicides and serious problems were developing with resistant weed species.

By 1967 the use of the above materials has increased so that now 27,000,000 acres (about 70% of the cereal crop acreage) are being treated annually. In addition, during this period several new herbicides have been introduced to take care of weeds not previously controlled. Some of the newer materials are diallate, triallate, barban, dicamba, bromoxynil, mecoprop, dichlorprop. Reliable data on the amounts of the new materials used are not available but I estimate that about 8 to 9,000,000 acres were treated in 1967.

The total cost of the chemicals used on field crops could be \$18,000,000 with another \$7,000,000 for cost of application. The average losses caused by weeds can be safely estimated at 15%. Thus, if 36 million acres are sprayed and an average yield of 18 bu/acre obtained, the potential yield increase is 97 million bushels with a value of perhaps \$140,000,000. Thus, the net benefit from the use of herbicides in grain crops on the prairies can be estimated at \$115,000,000 each year.

Weed scientists at Regina Research Station, cooperated with industry, to make this development possible.

(Regina Research Station)

Control of green foxtail in oats and barley

Research initiated at Brandon and collaborated in by other Research centres resulted in the extension of recommendations for safe use of TCA to include treatment of oats and barley at 1-2 lb/a to control this weed. This resulted in a dramatic increase in sales of this inexpensive herbicide from 83,000 lb in Manitoba in 1964 to 522,500 lb in 1967. Even allowing for

a tremendous increase in use for crops previously covered in the recommendations it was estimated that 250,000 lb of TCA was used to treat 200,000 acres of oats and barley in 1967. With a net return of \$2.00/a as a result of treatment this would represent \$400,000 increase in net income in Manitoba alone due to control of this weed.

Control of Wild Oats in wheat, barley and flax

Research at Brandon in co-operation with other Research centres is estimated to have produced an additional net return of \$1,000,000 for Manitoba farmers in 1967. This is based on an estimated yield increase of 2-5 bu/a because of control of wild oats. Allowing for the cost of the chemical and application, it is further estimated that a net benefit of \$3.00/a (equivalent to 2 bu of wheat) would be reasonable and this applied to 339,000 acres of treated land in 1967 would result in one million dollars otherwise lost to the weed in Manitoba.

(Brandon Research Station)

Reduction of summerfallow

Results of tests on coarse textured soil in northeastern Saskatchewan show that where farmers replace the standard three-year grain rotation (where one-third of the land lies idle in summerfallow each year) with a longer term grain, forage sequence (where complete summerfallowing is reduced to one year in six) they can increase the total return from their land. On one soil (White Fox sandy loam) this change increased the return from \$17.30 to over \$30.00 per cultivated acre.

On medium and fine-textured soils in the area, carefully managed stubble will produce more than 75% as much grain as summerfallow land. The data show that through modern technology (fertilizer, weed control, and management practices) farmers can reduce the acreage of land in summerfallow to 35% or less and increase their net returns by as much as \$9.00 per cultivated acre.

(Melfort Research Station)

Wheat production under dry land conditions

In recent years we have had low precipitation, but farmers using good practices have grown reasonably good crops. Our long term records show that the relationship between wheat yields and precipitation at Swift Current in the late 1920's was about 1.1 bushels per inch of precipitation. This has gradually increased to about 1.7 bushels per inch in the early 1960's. We attribute this to the application of new technology, including new varieties,

techniques of moisture conservation, weed control, and better equipment. The advantage of the new technology is most noticeable in the dry years. Research at the Swift Current Research Station has contributed materially.

(Swift Current Research Station)

Heterosis in beef cattle

Studies with the Highland and Hereford breeds at Manyberries have contributed significantly to the heterosis data being accumulated throughout North America. As now applied in the industry, the results of the work will provide for the following increases in production: calf survival, 2 to 5%; weaning weight and yearling weight, 5%; crossbred cow conception rate, 3 to 6%; and weaning weight of calves from crossbred cows, 6%. The total difference (in percent increase of yearling weight produced per cow bred) between continuous straightbreeding and systematic crossbreeding (using the crossbred cow) could be as high as 25%.

(Lethbridge Research Station)

Starter ration for beef cattle

Starter rations for beef cattle devised to permit self-feeding of concentrate feeds to cattle immediately after being put in the feedlot save hand feeding for 3 to 4 weeks. The starter ration has reduced feed required to reach market weight, risk of digestive upset and death when cattle are going onto feed, and labor and equipment required to feed the cattle. It is estimated to be worth approximately \$1,000,000 annually to the Alberta cattle feeding industry.

(Lethbridge Research Station)

Soil erosion control

Research at Lethbridge has shown that if most or all of the topsoil is removed by wind erosion or by other agencies, yields of grain will be reduced by 50% or more in most years (10-year averages were 28 and 10 bushels of barley). Plant residue conservation experiments continued during the past 10 years have provided a factual basis for the selection and use of equipment in the application of the trash-cover conservation practices. Cultural techniques that gave the best erosion protection (usually with a minimum of tillage effort), i.e., the trash-cover fallow, were shown to produce the best yields in most years of a 10-year study. Farmer acceptance of the practice is increasing and a gradual reduction in the wind-erosion hazard is evident.

(Lethbridge Research Station)

Fertilization of cereals on dry land

A significant proportion of the increased use of fertilizers on dry land cereal crops in southern Alberta must be attributed to the recommendations for its use that have arisen from the tests conducted by the Lethbridge Research Station. Fertilizer use in Alberta has increased from approximately 80,000 tons used in 1959-60 to 411,000 tons in 1966-67. A large proportion of this increase has occurred in the southern part of the province.

(Lethbridge Research Station)

Efficient irrigation of crops

Evapotranspiration data for irrigated crops have been related to currently measured meteorological variables. Application of these relationships has enabled extension personnel to provide a widespread irrigation scheduling service. Substantial yield increases have been attributed to this program.

(Lethbridge Research Station)

Fertilizer use on irrigated land

Reasonable estimates of growers' per acre yield increases during the past 10 years, as a direct result of fertilizer research on irrigated crops are as follows: potatoes, 7 to 10 tons; field peas, 1,000 to 1,500 pounds; green peas, 1½ to 2 tons; and bush beans, 2½ to 3½ tons. Judicious use of fertilizer and proper irrigation has enabled malting barley to be established as a high yielding good quality crop on irrigated land.

(Lethbridge Research Station)

Fertilization of range land

Experiments with the increasing rate fertilizer spreader have demonstrated that economic responses to fertilizer applications can be obtained on cultivated hay land or seeded range land of the prairies, but not on native grasslands. Much higher rates than previously recommended can be applied profitably. The use of recommended fertilizing practices could double the cattle population and greatly increase the value of the western hay crop.

(Lethbridge Research Station)

Corn for silage

Variety and cultural trials have demonstrated that corn can be grown successfully for silage in southern Alberta. Corn could produce twice as much energy per acre as is now being produced by traditional feed crops. Converted to livestock products this would give an additional net value of

\$6,000,000 annually to the livestock industry of southern Alberta.

(Lethbridge Research Station)

Reseeding of native range

Reseeding experiments have shown that when native grasslands are replaced by Russian wild rye and alfalfa the animal carrying capacity is approximately tripled. In southern Alberta alone this could increase the value of the calf crop by about \$50,000,000 annually.

(Lethbridge Research Station)

Nematode transmission of bacterial wilt of alfalfa

The alfalfa stem nematode has been found to accelerate the decline in hay yields caused by bacterial wilt. The nematode also predisposes one of the wilt-resistant varieties to wilt and has made it advisable to include nematode resistance in alfalfa varieties destined for use in southern Alberta..

(Lethbridge Research Station)

Lacombe hog breed

Lacombe breed development - superior growth rate, superior carcass merit, substantial evidence of superior resistance to respiratory infections. Breed now comprises 12% of Canadian purebred seed stock and is claimed by provincial authorities (Man., Sask., Alta.) to sire approximately 50% of commercial hogs marketed in these provinces. Provided the first opportunity for systematic use of hybrid vigor and was a basic stimulus to development of constructive cross breeding operations. Based on reduced overhead because of speed to market - 2 million hogs with Lacombe blood could mean a saving of up to \$4,000,000 annually.

(Lacombe Research Station)

Increase nitrogen application on saline soils

Discovery of a nutritional disorder common to crops grown on Solonchic soils. It was found that Solonchic soils, because of the saline conditions under which they developed have a very low capacity to release nitrogen by biological processes. Ordinary rates of application of nitrogen were found to be far too low to meet crop requirements on these soils. There has been a very marked increase in fertilizer use on solonchic soils. A reliable estimate of the profits resulting from this finding is unavailable. However, profits of more than \$10.00 per acre per year are common. If a modest area of 100,000 acres of the more than 15,000,000 acres of Solonchic soils has been properly fertilized then profits exceed \$1,000,000 per year.

(Lacombe Research Station)

Development of Bushland

During the past ten years, precise depths, times and the most suitable equipment for clearing, breaking and seedbed preparation of bushland for agricultural cropping have been developed and fertility requirements established for initial cropping. Application of this broad group of methods will conservatively increase net return per acre by 10 dollars during the first three cropping years. With 200,000 acres being developed annually the net benefit to the industry of application of these methods is 2 million dollars. With 10 million acres of bushland yet to be developed, the total benefit to the industry could approach 100 million dollars.

(Beaverlodge Research Station)

Development of the concentrate method of spray application

Research started prior to 1958, and continued to 1963, has resulted in the general acceptance of compact, light, less expensive air-blast sprayers which apply from 50-100 gallons of diluted spray per acre. It reduced the cost of controlling insects and diseases to about half that of the high-volume, hand-gun spraying of earlier days, or a saving to growers of around \$500,000 per annum. In addition, a messy and irksome job was transformed into a relatively simple, routine operation. The prototype sprayers were designed by our Agricultural Engineering section. It started a new small industry of sprayer manufacture, some units being exported.

(Summerland Research Station)

Tree fruit virus diseases

Summerland has one of the three pioneer programs in North America on tree fruit virus diseases, demonstrating the presence and importance of viruses in apple and indexing techniques to detect them. The immediate significance of this work has been (a) a demonstration that viruses occur as latent infections in most trees of commercial apple orchards, reducing the vigor and cropping efficiency of the infected trees; and (b) proof that a number of tree, fruit, and foliage abnormalities occurring on commercial apple varieties are virus-induced, and thus not subject to correction by spraying or cultural practices.

(Summerland Research Station)

Irrigation for fruit trees

Budget method of irrigation is resulting in marked savings in irrigation water requirements of tree fruits. By this method, irrigation is applied only when evaporimeter measurements show it is needed. Previously irrigation was

carried out on a regular schedule which resulted in much over-irrigation during the spring and fall and in cooler summers. Savings of irrigation water are in the 10-20% range and dam capacity requirements are reduced by this amount. In addition growers save the labour and electric power needed to irrigate. Both direct grower costs and capital dam costs are reduced about 10-20 per cent.

(Summerland Research Station)

Bloat in cattle

18-S protein has been identified as the cause of lethal pasture bloat and a tolerance of 1.8% has been established. This discovery can be passed on to industry and when applied will save losses of \$11,000,000 annually in Canada and \$110,000,000 annually in the United States. This is important research which has made a distinct contribution to basic scientific knowledge of value to Agriculture. It has sparked renewed interest and research among groups of scientists in several parts of the world.

(Summerland Research Station)

Mineral deficiencies in cattle

Severe copper and moderate zinc deficiencies related to the level of these elements in the forage have been identified in wide areas of the interior of British Columbia. This discovery is already saving the industry money as leading producers are now supplementing the feed with zinc and copper. When this principle is fully applied it is estimated that there will be 10% or around \$3,000,000 added income per annum to the cattle industry in the Interior of British Columbia.

(Summerland Research Station)

Continuous roll cooker-cooler for canned fruit

This is a low-priced continuous cooker-cooler specifically designed for small to medium sized canneries. By reducing the processing time for large 100 fl. oz. cans of soft fruit or berries to 1/3 to 1/8 of that required in conventional non-agitating cookers, the Rolltherm unit cuts flavor loss and gives better color and texture. Quality of fruit given a rapid process in large institutional size cans is as good as that of fruit processed in 14 fl. oz. cans normally used in the home.

Major design advantage of the equipment, apart from its low cost, simple construction, and ease of maintenance, is its adaptability to different can sizes and process specifications.

The Rolltherm cooker-cooler is in commercial use in Canada and several

Canadian and U.S. companies have enquired about building the unit under licence. Of particular interest internationally is the units potential for processing a number of tropical fruits requiring rapid heating and cooling.

(Summerland Research Station)

Utilization of surplus dairy males for beef

Prior to 1960 surplus dairy males, excluding the small proportion used for veal, were considered a nuisance byproduct of negligible monetary value.

Agassiz was the first station in Canada to initiate detailed carcass evaluations of the dairy male. These studies have revealed that excellent meat can be produced by these animals provided an adequate finishing ration is fed. In consequence, dairy feeding stock are in strong demand. This has more than trebled the price of surplus calves from dairy herds. In the Fraser Valley area this increase in value is worth \$750,000 per year.

Recent studies with Holstein bull carcasses have shown that a potential exists for the production of meat from the intact dairy male. If slaughtered at about one year of age the meat can be produced more economically than for steers.

(Agassiz Research Station)

Insect and weed control by non-chemical means

By simulating and emitting the sound of a bat with a broadcast device, the infestation by the corn borer, Ostrinia nubilalis, can be reduced by more than half.

The European skipper, Thymelicus lineola, a pest of hay and pasture grasses, can be effectively controlled by spraying with the bacterial pathogen Bacillus thuringiensis in the form Thuricide 90T.

The pastureland weed, Senecio jacobaea, has been controlled in parts of British Columbia and Nova Scotia by introduction of the cinnabar moth, Hypocrita jacobaeae.

The pastureland weed, Hypericum perforatum, has been controlled in parts of British Columbia by introduction of two beetles, Chrysolina spp.

DD-136, a nematode-bacterium suspension sprayed on to foliage to kill insect pests, can be rendered much more effective if combined with an evaporation retardant (Gelgard M) and two surfactants (Folicote 351 and Arlatone T).

(Belleville Research Institute)

Epidemiology of bacterial blight of field beans

Fuscos blight of field beans was first reported in Canada in 1961 and was subsequently shown to be the principal disease in beans. As a result of work on the epidemiology of the disease and on infected seed, new regulations for the handling of seed were put into operation in 1967 which were the direct result of laboratory studies. During 1968, 16 of the 20 areas so controlled in Ontario were blight free. Areas not subject to the new controls were heavily infected (75-100%).

Almost all the beans in Canada are grown in southwestern Ontario under a total acreage of 86,000 acres with a yield of 30 bushels per acre in uninfected fields while infected areas usually only yield 8-10 bushels per acre. Value of the total crop is estimated annually at \$8,000,000.

(Cell Biology Research Institute)

Protective foams against frost damage

Research into methods to insulate crop plants against frost damage has led to the development and successful application of newly formulated, protein based, fire-fighting foams for the complete protection of a number of plants (e.g. tomatoes, strawberries) in the field overnight against frost damage. An inexpensive foam has been developed and a mechanical applicator engineered in conjunction with Laurentian Concentrates Limited. Widespread interest exists throughout Canada and the United States in this development. It is impossible to estimate what savings in dollars will be realized from this work as it will relate, each year, to the number of nights, during which the sudden drop in temperature to below the freezing point is significant to particular crops in particular areas. There is a great deal of excitement in the industry about this research and growers are hoping to augment their incomes by appreciable amounts.

(Cell Biology Research Institute)

Use of turkey manure in the management of soil-borne wheat mosaic virus

Practically all fields in which winter wheat is grown in southern Ontario are infected with soil-borne wheat mosaic virus. Yield losses have been variously reported between 7 and 41%. Pretreatment of the soil with turkey manure prior to sowing has totally eliminated this disease in areas where it was tried while neighbouring fields remained heavily infected. This work should be pursued with a view to identifying the causal agent for this protection. Economic control measures are almost at hand, but it is too early

to be able to estimate probable savings.

(Cell Biology Research Institute)

Estimating wheat production

Prairie wheat production, which is worth about a billion dollars annually varies greatly from year to year mainly because of weather differences. A set of regression equations developed by Williams makes possible the estimation of wheat production from precipitation and potential evapotranspiration data. It appears that useful estimates of probable production could be made from weather data at least as early as the end of June. If such early estimates enable the saving of, say, 5% of the gross value of the crop when used in decision making by marketing and transportation authorities, the potential annual saving would be \$50,000,000.

(Plant Research Institute)

Agricultural water needs

The future development and use of Canada's water resources are under study by many groups. Research into agricultural water requirements is most important to assure that Canada's future water requirements are protected before possible water surplus is made available for export.

Holmes, Robertson and Baier have developed a method for estimating on a probability basis, irrigation requirements for various stages of crop growth on soils of various water holding capacities from standard climatic data. This technique has been applied to analyse 30 years of climatic data for 42 CDA establishments. This information provides background data for sound planning in the use of water for agriculture in Canada.

(Plant Research Institute)

Biometeorological time scale

There are about 19,000,000 acres of potentially arable virgin land in the Peace River Block of Alberta and British Columbia and the MacKenzie River Plains. There are virtually no weather observations and no cropping experience in much of this region. By using the biometeorological time scale concept developed by Robertson, it is possible to estimate how far towards maturity wheat can develop in this region. The technique also shows the risk of freezing temperatures at the time of maturity. This type of analysis has provided a basis for decisions which prospective farmers, economists, town planners and engineers must make regarding the opening of this virgin land which can be a multimillion dollar venture.

(Plant Research Institute)

Decontamination of milk

Work was started at the Research Branch in 1959 on methods of removing strontium-90 and caesium-137 from milk. A novel technique was discovered which successfully removed the undesirable isotopes of strontium and caesium without altering the composition or flavor. The method was patented to protect the public. Scientists at the U.S.D.A. and U.S. P.H.S. modified the technique to render it more effective and proceeded to develop a commercial plant using as a basis the technique discovered in Canada. Their efforts culminated in the successful design and operation of a full scale commercial system for the processing of 100,000 lb. of fluid milk per 8-hr. day. The design of this plant is presently in the hands of the Emergency Measures Organization of Canada and if circumstances require its use, we have the information necessary to enable us to operate the system.

(Animal Research Institute)

Hay fever pollens

Studies on air-borne pollen were completed for southern Saskatchewan, Manitoba and British Columbia. The hay fever pollens for these provinces are seen in better perspective when they are compared with those of Ontario and Quebec. These studies have extremely valuable application by the Canadian Government Travel Bureau. Our publication "Canadian Havens from Hay Fever" is one of the most widely distributed Canadian publications. The genus, Plantago, containing a large number of important hay fever plants and weeds, has been studied cytotaxonomically. Another aspect of our pollen research which deserves mention is the permanent pollen slide collection. This reference collection is becoming more valuable each year.

(Plant Research Institute)

Control of animal diseases

The Animal Pathology Division research contributes directly to the disease control programs of the Health of Animals Branch. Based on a recognized method of estimation which takes into account the rate of disease infection, it has been determined that the control of three animal diseases alone has saved \$27 million in Canada. The three diseases are:

Tuberculosis	\$10 million
Brucellosis	\$10 million
Hog cholera	\$ 7 million.

(Animal Pathology Division)

Agricultural economics

Since projects and programs completed during 1962-67 have scarcely had time to make an impact on Canadian economic development, the time period for the following examples goes back to the end of the last World War.

- (a) The land classification program in Western Canada provided a basis for taking submarginal land out of crop production and putting it into community pastures and for other land use adjustments.
- (b) In 1950 the Branch undertook a comprehensive study of crop insurance and the Prairie Farm Assistance Act. The work and experience enabled the Branch to develop the Crop Insurance Act which has now been implemented in most of the provinces and will be adopted even more widely.
- (c) The continuing studies of the Branch in farm credit enabled the Branch to make a substantial input into the development of the Farm Credit Act in 1959 and to advise on revisions since then.
- (d) A study by the Branch on co-operative use of farm machinery enabled the Branch to make a substantial contribution to the development of the Farm Machinery Syndicates Credit Act.
- (e) A number of studies on small farms enabled the Branch to make a substantial contribution to the development of the Agricultural Rehabilitation and Development Act.
- (f) A study of price support activities enabled the Branch to make a substantial contribution to the development of the Agricultural Stabilization Act.
- (g) Research in the demand supply and price situation of various agricultural commodities enables the Branch to do the major part of the work for a Federal-Provincial outlook conference each year on which plans of farmers and of agri-business generally are to some extent based.

(Economics Branch)

Characterization of viruses

Research into the physical and chemical characterization of plant viruses, have opened up the field of the correlation of physiological and biochemical effects of plant virus infections with their cytological and fine structural effects. The work on characterization of viruses began with the purification of non-aggregated potato virus X and the subsequent analysis of the amino acid

composition of two strains of this virus. This was followed by the analysis of amino acid and nucleotide composition of southern bean mosaic, cowpea mosaic, carnation ring spot, cucumber necrosis, and rhubarb viruses. This systematic purification and analysis of viruses is in itself a very important contribution to the building up of a comprehensive background of basic information that is constantly needed and referred to by everyone in the field of plant viruses, so that research in other areas can be interpreted correctly, so that those viruses can be selected that are optimally suitable for a particular line of enquiry, and so that an understanding of the relationships among the viruses -- of which we are still woefully ignorant -- can eventually be attained. In addition to this aspect, however, these systematic studies have been applied to the first attempts made to construct a mathematical-chemical model of the structure of viruses. Thus, the information obtained from the amino acid analyses has been utilized to calculate the surface areas of virus protein exposed to its nucleic acid and to an aqueous medium. This area, coupled with the protein subunit volume, has now been incorporated into an overall mathematical scheme that can predict the final structure of icosahedral viruses from their amino acid composition. Although this is a pioneer attempt still in its initial stages, it has already attracted considerable attention.

(Vancouver Research Station)

Mode of action of insecticides and anti-fungal substances

The results from biochemical studies of the mechanism of oxidative phosphorylation are now being used elsewhere to study the mechanism of action of a new class of insecticide. Similarly the research on mode of action of organophosphorus insecticides and the detailed studies of differences in the inhibited acetylcholinesterase have been used to explain many instances of potentiation in toxicity of mixed chemicals. Recommendations can now be made that avoid this serious loss of selective toxicity in field use.

The detailed study of the mode of action of the dithiocarbamate fungicides has been used to produce more active material commercially and also resulted in more efficient use in the field.

The isolation, chemical characterization and now biochemical studies of fungal toxins associated with specific diseases of cereals are now giving a better insight into the action of the fungus and thus produce a better opportunity for control. Similar studies on naturally-occurring antifungal materials are helping in the ultimate control of specific parasites.

(London Research Institute)

Physiology of the barley loose smut fungus

Physiologic studies on barley loose smut shows that haploids can be isolated by microsurgery on germ tubes growing on a medium containing benzoic acid, and that the haploids of plus mating type require proline for subsequent growth. This has enabled geneticists to study the inheritance of pathogenicity and other characteristics of this species and enables a planned program for the development of smut-resistant varieties.

(Winnipeg Research Station)

Biochemical studies on wheat

The primary objective of our work in physiology of host-parasite relations is to clarify the biochemical action of the genes for rust resistance in wheat. Knowledge of this type would permit a more rational approach in efforts of plant breeding for rust resistance.

Since most "defense" products of other hosts are known to be aromatic, we initiated a study on the biosynthesis of aromatic compounds in rust-infected wheat leaves. This study has shown that the resistant reaction differs from the susceptible reaction in - (1) increased synthesis of bound hydroxycinnamic acid esters (lignin precursors), (2) accumulation of insoluble, non-hydrolyzable material ("melanin"-fraction), and (3) in the occurrence of soluble hydroxycinnamic acid conjugates. These conjugates contain one or more moieties of a polymethylenediamine and possibly a peptide moiety. It is not yet known whether they have any biological activity. The origin of the hydroxycinnamic acid moieties in these conjugates is highly unusual, because phenylalanine and tyrosine do not serve as precursors in their synthesis. Other results of general plant biochemical interest include evidence for a new biosynthetic pathway from quinic acid to phenylalanine, not leading via shikimic acid, and evidence indicating that wheat leaves, unlike microorganisms, do not synthesize tryptophan from quinic acid or shikimic acid.

(Winnipeg Research Station)

Microbial association and competition in soil

Microbiological studies have established that there is a strong selective action of plant roots on specific types of bacteria. Species of microorganisms have been identified as being beneficial (i.e. stimulatory) to the growth of plants (e.g. by producing large amounts of gibberellins) while others have been shown to produce substances which are toxic to plant growth. Foliar sprays

containing a variety of chemicals can be used to alter the balance of organisms normally found in the rhizosphere. With proper selection of the chemical agent it is conceivable that specific crop development could be directly aided by specific agents. This approach to crop management may not have reached the stage of being immediately applicable to industry, but should, in our opinion be considered along with other approaches.

(Cell Biology Research Institute)

Discovery of the broad spectrum antibiotic "myxin"

The antibiotic "myxin" was discovered in the culture fluid of a soil-borne Sorangium spp. and found to have an extremely wide spectrum of activity in laboratory experiments being highly effective against bacteria, fungi, yeasts and actinomycetes. The antibiotic was isolated and crystallized, its physical structure was determined and a variety of chemical properties were studied.

Hopes were high initially, for use of myxin as a universal agent against plant and animal diseases, but its low solubility and some degree of toxicity in animal experiments have caused a temporary setback in the wide use which was anticipated at first. This is nothing unusual to those who recall the early history of penicillin. Proper evaluation must await the availability of more soluble, chemical derivatives with the aid of which new impetus will be given to this work. While systemic effects are difficult to demonstrate in plants with the parent compound, it is equally true that myxin crystallizes out at the site of injection or application - this again argues in favor of more soluble derivatives being prepared. We have synthesized 3 such compounds, 1 of which had the same biological activity as the parent compound but was 15 times more soluble.

(Cell Biology Research Institute)

Enzyme-based approach to possible treatment of fungal wilt disease

Fructose-1, 6-diphosphate aldolase purified from Fusarium oxysporum f. lycopersici was found to be a class II (metal ions required) enzyme in contrast to the plant host which was established as a class I enzyme (requiring no metal). It should, thus, become possible now to discover agents which will inhibit the enzyme of the fungus while leaving the plant enzyme intact. An enzyme-based approach to the treatment of wilt disease has now become feasible.

(Cell Biology Research Institute)

Biochemical basis for susceptibility to tobacco weather fleck

In the study of the basic aspects of tobacco weather fleck, it was found that the susceptibility of tobacco leaves to ozone is of a biochemical nature and related to the level of soluble sugars and nitrogenous constituents. The susceptibility can be reversibly changed by chemical treatment regardless of varietal difference and maturity. Investigations also showed that the phosphorylative system in tobacco leaf mitochondria is very sensitive to ozone. Ozone at low concentrations severely inhibits oxidative phosphorylation and, with increasing concentration, enhances swelling and permeability of the mitochondrial membrane. Damage by ozone to the vital biochemical functions and the structural integrity of cellular membranes is of particular significance to the subsequent development of injury in tobacco leaf tissues. Therefore, preservation of cellular membrane is considered a key in the prevention of ozone injury in tobacco. The knowledge on the reversibility of ozone susceptibility in tobacco leaves and on the sensitivity of cellular membrane to ozone would provide basis for the search of chemical control of weather fleck in tobacco.

(Delhi Research Station)

Population dynamics of apple and corn insect pests

The first application of the life-table approach to the population dynamics of apple and corn pests was initiated and successfully carried out at St-Jean. These studies measure seasonal fluctuations in abundance of the insects. They also determine, through analysis of the mortality factors and biotic potential, the regulating mechanisms of these fluctuations. Such studies contribute to the preventive aspects of pest control and open new avenues in assessing insect epidemiology.

(St. Jean Research Station)

Research on fungi

Research emphasis in mycology is placed on taxonomy, life histories, distribution, host ranges and species interrelationships in order to discharge our primary responsibilities. The main service provided is that of identification; we are responsible for giving expert advice to Agriculture, Forestry and other government departments, as well as the general public, on problems of a mycological nature. Our other main responsibility is the development and maintenance of the National Mycological Herbarium. The herbarium provides a central mycological reference collection for all Canadian mycologists and

visiting research scientists.

The research accomplishment of this group is one of the highest in the Institute yet it is difficult to measure the value of their contributions in terms of dollars. The contributions are certainly the basis for disease diagnosis in the applied fields of pathology in both agriculture and forestry. They also serve the Plant Protection Division in the recognition of new diseases.

(Plant Research Institute)

Plant taxonomy

Projects in this section have been guided by the need to develop and retain scientific competence in all the major groups of flowering plants; by the needs of agriculture and other applied fields; and by their contribution to botanical knowledge. As a result, the main accomplishments are definitive monographic treatments of specific groups based on cytogenetic principles; resolution of species interrelationships especially as they relate to plant evolution and the development of new forms; and geographic surveys. These researches have resulted in the development of a basic research data bank of botanical information in the form of a herbarium. Our herbarium is the most important repository of botanical material in Canada and ranks in the top twelve of North America.

(Plant Research Institute)

Taxonomy of agricultural plants

Much research has been devoted to the taxonomy, cytology and evolution of specific genera having direct or indirect relationships to agriculture and include: Gramineae, Avena, Hordeum, Agropyron, Conciferae, Compositae, Chenopodiaceae, Rosaceae, and Linaceae.

Some of the more significant contributions include the clarification of the relationships of the wheats, ryes and barleys and their wild relatives; the degree of intraspecific and interspecific zonations and the mechanisms of evolution in the Cruciferae; taxonomy and cytology of legumes (Trifolium was selected as the first genus to be studied because of its horticultural and forage potentials); and the mechanics of race and species formation in the flax genus, Linum.

(Plant Research Institute)

Biology of weed species .

Weeds are very important in all agricultural operations; railways, highways, utility lines also suffer losses through fire hazards; and a large number are health hazards because they cause hay fever. A conservative estimate places the annual weed cost to Canada at \$200 million and it would be quite easy to defend a much higher figure. A great deal of research is devoted to the control of weeds but we need to know much more about their relationships, taxonomy, breeding behaviour, source of introduction, habitat preference and their distribution and spread. The taxonomy of a number of important weedy groups in the genera Lepidium, Cardaria, Linaria was clarified. Maps of distribution of three species of Cardaria were prepared. The thistles of Canada, the bulrushes and some of the large weedy families such as Cruciferae, Plantaginaceae, Polygonaceae, Amaranthaceae, and Chenopodiaceae have received special attention because of their economic importance as weed plants.

(Plant Research Institute)

Selenium deficiency in animals

The seleno compounds in pasture grasses were isolated and characterized. The bulk of selenium was found to exist as protein-bound selenocystine and selenocysteic acid, selenite, and bound to leaf proteolipids and phospholipids. All the forms of selenium, except that lipid bound, were well absorbed and retained by young ovine indicating that in selenium deficient areas the low selenium content of pasture causes myopathy rather than a deficiency of a particular plant form of the element.

The injection of selenite into calves and lambs is an effective means of preventing NMD. Recent biochemical studies with laboratory animals have shown that when selenium is administered in this manner, the element is not incorporated into the serum proteins as selenocystine or selenomethionine. It has been demonstrated for the first time that the bulk of selenium is transported in the serum proteins covalently bound between the sulfurs of inter or intra S-S peptide linkages.

Rumen bacteria are capable of metabolizing inorganic selenium and incorporating the element into the microbial protein.

(Animal Research Institute)

Animal genetics

In the area of quantitative genetics and selection theory, world recognition has been given to the theory underlying the development and

maintenance of control populations as developed by scientists of A.R.I. for populations of poultry and dairy cattle. These methods are being widely used at research centers in North America and Europe. Some industrial breeding organizations are also using the techniques.

A classic long-term study on selection for increased egg production in poultry has been under way for 19 years. Great interest has been expressed in this study by quantitative geneticists interested in selection plateaus and inbreeding depression.

Extensive studies on the importance of genotype-environment interactions on poultry improvement have been reported in the literature. Some of these studies have resulted from collaboration with several Branch Stations. Our reputation here is international and recognized widely.

(Animal Research Institute)

Animal nutrition

Fundamental studies have revealed that various physical and chemical treatments (e.g. with alkali or irradiation) can 'unlock' much of the potential energy of low quality roughages and even wood, which is not normally available to rumen micro-organisms. In some instances the feed value of straws and wood has been elevated to that of medium quality hay. While technology and equipment is not yet available to make such processes a commercial proposition, work is continuing with the object of developing methods for industrial application.

(Animal Research Institute)

Cold hardiness in plants

First details on the chemical mechanisms underlying frost hardiness were obtained. Not only is replication of total protoplasmic substances (including organelles such as mitochondria and microsomes) involved, but also biosynthesis of phospholipids and lipoprotein play a major role. The latest work on phospholipids has just received international acclaim (living bark of the black locust tree).

(Cell Biology Research Institute)

Bluetongue disease of livestock

Several years ago a disease known as bluetongue in sheep occurred in southwestern United States. After a period of time it spread to some of the more northern states and caused some concern lest it might spread to Canada. Additional concern developed when it was learned that cattle could become carriers of the disease and yet show no symptoms.

Workers in the Animal Pathology Division undertook to study this disease with a view to learning something about its transmission and to develop methods to identify carriers of the infection. As a result of this work, a modified complement fixation test was developed. This test identifies animals which had been exposed to the disease and might be carriers.

This test has already proven to be of value on several occasions when it was suspected that outbreaks of this condition had occurred in Canada. In addition, it has permitted the Branch to certify cattle for export to certain countries that would not accept the cattle without certification that they were free of bluetongue. For example, the latest shipment of cattle exported to Great Britain was valued at about a million dollars.

The development of the test has also aided other countries. The United States has sent a team of scientists to our laboratory to become acquainted with this testing procedure.

(Animal Diseases Research Institute)

Diagnosis of hog cholera

It was found during outbreaks of hog cholera that the period of six or more days required to establish a definite diagnosis of this disease, was too long to enable field workers to control the spread of infection. A program of research to develop more rapid and more precise methods of identifying this disease was initiated, and a team of scientists at the Animal Diseases Research Institute approached the problem in different ways. Eventually several tests were developed providing much more rapid diagnosis of the disease. Two of these tests in particular, the fluorescent antibody test of tissues and the fluorescent antibody test on tissue culture isolations of the virus, are of particular value, the former enabling the diagnosis to be performed as early as four hours after suitable specimens are received at the laboratory.

With the development of these tests the Department is now in a much better position to deal with outbreaks of hog cholera, if and when they again occur in Canada. The disease can be identified quickly and the infected

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animals destroyed before the infection has a chance to spread to a large number of farms.

This work was carried out over a period of several years and is estimated to have cost approximately \$125,000. It is estimated that this will be saved in the next outbreak alone because of the speed with which the disease will be dealt with.

(Animal Diseases Research Institute)

2.9. Projects

2.9.1. List of Project Titles

Although it has been specifically requested that a list of project titles for each unit for each of the years 1962 to 1967 be provided, it will be readily apparent that the sheer bulk of such lists would create a logistic crisis. Furthermore, since research projects do not change rapidly from year to year, a complete listing for each year would be unnecessarily redundant.

Instead, two years were selected as indicative of the scope of the research programs and the changes which took place over a five-year span. The years selected were 1964 and 1968. The lists of projects are attached as Appendices 11 to 18.

Extramural research project lists for 1968-69 are also attached as Appendices 7 and 8. (See also Section 2.7.a.4. and 2.7.a.5).

The grouping of projects that are part of specific programs is shown in the CASC 1966 Inventory of Agricultural Projects (Appendix 2) which includes projects conducted by all agricultural agencies in Canada, exclusive of industry. The inventory is arranged to bring related projects together by discipline and field of application.

The lists of projects for CDA Research Branch are coded for regional establishment location as shown in Table 2.9.1. It will be noted that there has been a reduction in the number of projects from 1964 to 1968. Most of the testing and adaptation trials, formerly listed as projects in 1964, and which are still active, have been removed from the 1968 research project list.

Table 2.9.1. CDA Research Branch Project Summary by Establishment Location, 1964 and 1968.

Location No.	Location	No. of Projects	
		1964	1968
300	St. John's W. Nfld.	33	24
303	Charlottetown, P.E.I.	50	38
304	Summerside, P.E.I.	5	2
306	Kentville, N.S.	66	55
307	Nappan, N.S.	40	21
309	Fredericton, N.B.	75	46
320	Caplan, Que.	7	2
322	Fort Chimo, Que.	1	-
324	L'Assomption, Que.	34	17
326	Lennoxville, Que.	29	26
328	Normandin, Que.	15	7
331	La Pocatiere, Que.	45	24
335	St. Jean, Que.	13	23
336	Quebec, Que.	-	2

Special Committee

2.9.1.

Location No.	Location	No. of Projects	
		1964	1968
141	Analytical Chem.	1	1
150	Animal R.I.	50	62
190	Entomology R.I.	76	77
195	Food R.I.	21	27
210	Cell Biology R.I.	13	27
220	Plant Research Inst.	39	30
230	Soil R.I.	65	53
250	Belleville R.I.	25	20
280	London R.I.	39	34
200			
338	Ottawa, Ont.	53	39
340	Chatham, Ont.	16	4
341	Fort William, Ont.	3	3
343	Delhi, Ont.	13	14
344	Harrow, Ont.	49	39
345	Woodslee, Ont.	6	6
346	Kapuskasing, Ont.	27	10
348	Smithfield, Ont.	23	19
352	Vineland, Ont.	16	18
360	Brandon, Man.	55	28
362	Morden, Man.	58	25
364	Winnipeg, Man.	44	43
370	Indian Head, Sask.	41	19
372	Melfort, Sask.	46	33
374	Regina, Sask.	16	16
375	Saskatoon, Sask.	63	54
377	Scott, Sask.	30	54
379	Swift Current, Sask.	84	62
380	Beaverlodge, Alta.	45	29
381	Edmonton, Alta.	2	-
383	Fort Vermillion, Alta.	15	2
385	Lacombe, Alta.	65	44
386	Manyberries, Alta.	9	4
387, 389	Lethbridge, Alta.	171	122
390	Agassiz, B.C.	29	27
393	Kamloops, B.C.	32	23
395	Prince George, B.C.	28	7
398	Saanichton, B.C.	33	21
402	Summerland, B.C.	67	52
404	Vancouver, B.C.	28	24
410	Mile 1019, Yukon	7	1
420	Fort Simpson, N.W.T.	7	1

Location No.	Location	No. of Projects	
		1964	1968
	Atlantic Provinces	269	186
	Quebec	144	101
	Institutes	329	331
	Ontario	206	152
	Manitoba	157	96
	Saskatchewan	280	195
	Alberta	307	202
	British Columbia	217	154
	Yukon and NWT	16	-
	Total	1925	1417

2.9.1.

A summary of the number of research projects for other units of the Department for the two selected years is as follows:

Unit	No. of Projects		
	1964	1968	
<u>Animal Pathology Div.</u>			
3820	Sackville, N.B.	11	12
4334	Hull, Que.	66	70
4714	Macdonald College, Que.	6	9
5360	Guelph, Ont.	-	2
6955	Winnipeg, Man.	1	-
7722	Regina, Sask.	1	1
8570	Lethbridge, Alta.	10	17
9950	Vancouver, B.C.	9	8
		104	119
<u>Grain Research Laboratory, Winnipeg, Man.</u>			
		17	34
<u>Economics Branch</u>			
		113	71

The Research Branch Project List is also coded by project numbers which indicate the broad classification of projects. (See Appendix 19 - "Code Book for Project Classification"). As explained in the Code Book, each project number consists of three groups of digits (e.g. 31.104.009). The first pair of digits refers to the broad "subject" area; the second group of digits, the specific subject subdivision; the third group of digits is the serial or accession number to distinguish between similar projects.

Referring to the Code Book - Project 31.104.009 indicates:

Plant Pathology (31)
 Potato (104)
 Project (009)

31.104.009 "Potato leafroll virus. Transmission and varietal testing". Thus, by selecting similar project numbers, one is able to group all projects related to a given program.

2.9.2 Examples of research programs representing successful coordinated approaches

In the solution of an agricultural problem it is frequently necessary to involve several agencies or disciplines, or to proceed from the basic to the applied to the developmental stages. Not only is it necessary but most often desirable to have a coordinated or progressive approach. Some of our most successful programs have been planned or have developed in this way. A few examples are presented below.

Rapeseed Research

Rapeseed is unique among the oilseed crops grown in Canada. About 25 - 45% of the seed oil consists of erucic acid. This fatty acid was thought, at one time, to be detrimental to human nutrition and the use of rapeseed oil for edible purposes in Canada was prohibited. Subsequent research proved the oil completely safe and it was cleared for use in edible products. Unfortunately, the stigma remained so that it became desirable to find a rapeseed oil which contained little or no erucic acid.

A few years ago seed of a late-maturing variety of forage rape was obtained from Germany. Some plants of this variety contained seed oil with the erucic acid replaced by oleic acid. It was now possible, through genetic analysis, to determine the inheritance of erucic acid content. This was a prerequisite to a breeding program based on hybridization of the new type with standard varieties, followed by selection for early maturity, erucic acid content, total oil content, and other agronomic characters.

Two obstacles to a rapid and effective plant breeding program remained. First, the embryo of the rape plant occupies most of the seed and contains the oil. This makes it necessary to analyze single seeds of hybrids rather than a multiple-seed sample from an individual plant. Secondly, the analytical method in use called for a relatively large sample and required a long time for each analysis. By chemical research it was possible to modify the liquid gas chromatography technique so that a single rapeseed could be analyzed in about 20 minutes to give a complete record of fatty acid content. Research into sampling and propagation methods showed how the remainder of the seed not used in the analysis could be grown into a mature plant.

The result of the total research program was the release in 1968 of a new variety, Oro. The seed of Oro rape is free of erucic acid, is similar to olive oil in fatty acid composition, and possesses properties highly desirable in a salad oil.

The Food Research Institute, CDA, Ottawa, is investigating processes whereby undesirable fractions can be removed from the oil and the development of other human food products from the meal. The University of Saskatchewan Engineering Department is attempting to develop an industrial oil and the Saskatchewan Research Council to produce the soap fraction for industrial grease. Rapeseed meal is used as a livestock feed and with reduction of toxic components its use can be extended to unrestricted feeding of young animals, including poultry and hogs as well as ruminants.

The seed produces about 40% oil and 60% meal. The rapeseed crop is grown on about 1.5 million acres and has a value of about \$54 million annually. Canada is the largest exporter of seed, most of it exported to Japan but some also to France and Italy.

Here is a research program involving genetics and plant breeding, chemistry and engineering, a program of cooperative research that involved federal, provincial and university research teams, and in which industry contributed in no small measure. Through the Saskatchewan Wheat Pool cooperation, it was possible to obtain increase of the variety Oro for large scale processing tests. Canada Packers and other industrial firms also cooperated.

Virus-free Varieties of Potatoes and Fruits

There are many virus diseases of crop plants which seriously affect both yield and quality. In vegetatively propagated crops such as small fruits, tree fruits and potatoes, virus diseases are of special concern since transmission of the virus is assured through cuttings, rootstocks, scions, budwood, runner plants or tubers. Transmission is far less common where propagation is by true seed.

It was early recognized in Canada that unless virus diseases were controlled, there would be a progressive accumulation of viruses in potato stocks and correspondingly decreasing yields would result. By instituting a potato seed certification plan whereby based upon field inspection and roguing of infected plants, relatively virus-free seed crops could be produced. CDA has been successful in gaining for Canadian growers, and particularly growers in the Maritime provinces, a preferred position in world seed potato export markets.

Unfortunately, some virus diseases remain symptomless and cannot be detected by field inspection. While some of these symptomless viruses may in themselves remain relatively innocuous, the introduction of other mild viruses may produce very drastic disease symptoms and effects. Unfortunately also, many of our most important commercial potato varieties are universally infected by symptomless viruses. The obvious answer is to produce virus-free nuclear stocks and attempt to maintain them free. Now this objective is being realized is the intriguing story of the Vancouver Research Station research program. Here basic research leading to a clearer understanding of the nature of plant viruses, their isolation, purification, characterization and identification, provides the background information upon which an applied study can progress.

By adapting known techniques of thermotherapy, by which infected plants are exposed to high temperatures sufficient to reduce the virus content without killing the plant host tissue, and by careful excision of axillary bud tissue which is then grown under aseptic conditions until a young plant free of any virus particles is obtained, it has been possible to produce virus-free nuclear stocks of many commercial potato varieties. Virus-free plants are multiplied by greenhouse grown cuttings and during the past summer extensive field multiplication has been carried out. It should be possible within the next few years to provide Canadian growers with virus-free seed potatoes from certified stocks maintained and renewed under provincial jurisdiction.

Here is an example of how the normal extension of basic research to the applied and developmental stages has been attained through federal-provincial cooperation.

Such a plan has been in effect for raspberry and strawberry propagative stock in British Columbia for several years.

Here, also, cooperative research by the Vancouver and Agassiz Research Stations laid the groundwork for development of a certification plan that is carried out under provincial authority.

Breeding for Egg Production

A long term selection study undertaken at the Animal Research Institute with egg production chickens and conducted over the last 17 years, has contributed significantly to the very substantial improvement in performance - from about 146 eggs per bird to 200 eggs for the commercial chicken in the last two decades. This study was conducted in cooperation with several Branch stations of the Research Branch. Because of the scale of the study and its design, it has been possible to demonstrate the effectiveness of selection for egg production within closed populations while maintaining or improving other essential traits such as livability, fertility, and egg size. The breeding principles revealed by this study have been used by successful poultry breeding concerns in Canada and elsewhere in the world.

The theory of control strains, and their utility in separating genetic and environmental effects, so that selection progress can be measured, has been widely utilized by the industry and by geneticists working with other domestic species of economic importance. A recent (1968) review from Britain of poultry breeding research has this to say about the Animal Research Institute study: "One of the most important experiments for animal breeding theory, and poultry

improvement in particular, is that started in Canada in 1950, Gowe et al. (1959). It is important because it is conducted on a large scale on several locations, hence minimizing random environmental effects, and because it is one of the few experiments on economic animals that has a proper control."

This study has also revealed to animal and poultry breeders that it may not be efficient in the long run to select breeders on the basis of part-year records, even when these have a reasonably high genetic correlation with records for the whole production year. These results may give a partial answer to the perplexing problem of plateaued populations - that is highly selected improved populations that apparently will not respond to further selection.

Because replicated test units were used in this series of studies at Branch Stations from British Columbia to Prince Edward Island, it was possible to obtain valuable information on the importance of strain-location interactions. These were shown to be of minimal significance, which means that national and even international distribution of genotypes (stocks) tested to be superior at one location will have a very high probability of being superior in other environments. This knowledge has been used in the breeding program of major Canadian poultry breeders.

Interspecific Oat Research at the Ottawa Research Station

The interspecific oat research began at the Ottawa Research Station in 1952 when a plant breeder became interested in transferring rust resistance from the 14-chromosome oat species Avena strigosa to the common hexaploid Avena sativa. His success with the autotetraploid of A. strigosa encouraged cytologists into the program. They found fruitful ground in the study of genome relationships and chromosome morphology and reported their research in two important papers, by 1961. It became evident that important material for breeding and cytogenetic research was missing from the program and a collecting trip was organized for the Mediterranean region in 1964. This report chronicles the highlights of the program since that date. It will show how the O.R.S. ultimately became the leading centre for interspecific oat work in the world.

An outstanding aspect of the research program has been the genetic variability in the material. This has enabled the scientists to develop interesting projects in both applied and basic research.

The transference of rust resistance from related Avena species has continued and several genes for crown rust resistance have been incorporated into standard oat varieties. Stem rust resistance including resistance to races 6A

and 6F is now being used in a backcrossing program. A gene for daylight insensitivity has been discovered and is in use. Several oat strains are under evaluation as grain varieties and one strain has impressive production as a forage oat. Strength of straw is a feature of some hybrids selected from the interspecific crosses; yield and grain size are others. A physiologist seeking an alternate method for overwintering of grain has selected dormant lines from the cross of A. fatua by A. sativa which can be planted in the fall, overwinter as ungerminated seed, and produce a good crop next spring. A new phase of research which holds considerable promise is the selection of lines with as much as 28% protein. American scientists from U.S.D.A. are also using the high-protein oat lines in their crossing programs.

The Canadian collecting trip of 1964 provided species that hitherto were not available for cytogenetic studies: among the 559 wild oat specimens a new tetraploid species, A. magna was discovered. The team which searched the shores of the Mediterranean included a Welsh geneticist. Later the team turned over part of their seed stocks to American collaborators, who first reported on the new species and its high protein content. A diploid species from the collection A. ventricosa along with A. magna are considered to be the putative ancestors of the common hexaploid oats. Cytogenetic research on species phylogeny, chromosome affinities, and on specific genes is continuing. Trisomic lines have now been developed which makes possible the transference of crown rust resistance into common hexaploids. Oat cytogenetics at the O.R.S. now commands considerable respect from scientists around the world. Fifteen research papers have been published. Postdoctorate fellows come to Ottawa to work in the unit. Biochemists from two Canadian and three U.S. universities are active cooperators. There is as well, the friendly rivalry and association of scientists from the U.S.D.A. and the Welsh program at Aberystwyth.

Canadian soil resources

The Soil Research Institute and the Pedology Sections of a number of Research Stations have cooperated with universities and provincial departments in the study of Canadian soil resources. To date some 260,000,000 acres have been studied, classified and mapped and some 2,500 different soils have been characterized. The soils are assessed in terms of their suitability for various purposes and their capability to produce crops under the given climatic environment, taking into consideration the physical, chemical and biological properties of the soils, and the feasibility of the management practices that ought to be applied.

These findings have already been widely applied by government agencies and by individual operators in numerous ways. One can mention only a few examples such as, the location and development of new land which is potentially suitable for agriculture, the location and development of suitable areas for irrigation; the development of community pasture on land unsuitable for arable agriculture; the development and concentration of special crops, such as, tobacco, orchards and market garden crops on soils particularly suited for such crops; the application of management and amelioration practices according to soil needs, such as, practices to control wind and water erosion on erosive soils, the management of solonchic soils, the drainage of seasonally wet soils, the liming of acid soils, as well as the application of many management practices to meet the fertility requirements of individual soils and crops. The findings of soil classification have also been applied in many engineering projects, such as, location and construction of highways, airports, pipelines, drainage ditches, canals and dugouts, the construction of sewage disposal systems and the location and construction of buildings. The findings of the survey have been used as the basis for an equitable land assessment by municipal and provincial governments for taxation purposes (e.g., Saskatchewan) and by financial institutions.

Although it is difficult to assess the actual value of the findings in dollar earned or saved, it is obvious that the overall amount is very substantial. It is safe to say that the ultimate value of the findings could be unlimited if and when fully applied in the sound planning of our natural resources on a national, regional and individual farm level. The need for such planning is becoming more and more obvious for the economic and social well-being of this Country.

Most of the research in the Soil Research Institute is designed to obtain a better understanding of the properties of different soils which will lead to more accurate prediction of the response or lack of response of different soils to management.

Agricultural outlook

The annual 'Situation and Outlook' project, which culminates in the annual Federal-Provincial Agricultural Outlook Conference, is probably an example of the Economics Branch at its best. This annual project is a team effort involving specialists from the Departments of Finance, Forestry, Industry, Manpower and Immigration, Trade and Commerce, the Dominion Bureau of Statistics,

the Bank of Canada, and several branches of the Department of Agriculture. The Economics Branch does the research work behind most of the forecasts and also functions as the organizer.

The principal objective of the Outlook Conference has been to provide provincial delegates, which may include university as well as government officials, with as much information as practical at as early a date in the year as possible on the national agricultural situation and outlook, so that this information may be adapted for use in their own provinces or regions and channeled through the provincial extension services to farmers and other users. A further objective has been to provide governments with forecasts of agricultural production, prices, and farm income as a basis for anticipating policy or program changes and the impact of changes in agriculture on the national economy. The agribusiness community and the farmers' organizations have been beneficiaries, also, of the conference objectives.^{1/}

Crop insurance

During the late 1930's and 1940's, the Branch assembled a great deal of empirical data to indicate fairly precisely the nature and extent of crop yield variability in the prairie provinces and in Saskatchewan in particular. The great variability of crop yields and the consequent variation in farm incomes was one of the most serious problems faced by farmers of this region.

About 1950, the Branch started a comprehensive research project on policies to lessen the impact of yield variability. The project concentrated on crop insurance and the Prairie Farm Assistance Act - a crop insurance type program. Empirical data analyzed included detailed information for about 5,000 townships for the period 1939-1949 and for about 5,500 farms in a sample of 59 townships. The crop insurance experience of the U.S. was also studied.

The study analyzed the costs and benefits of P.F.A.A. in relation to soil productivity and incidence of benefits. It analyzed effects of the program on resource allocation differentiated by farm size, price levels, and yields. Various operational aspects were studied. The degree to which it stabilized income was determined and alternative methods of stabilizing income were examined.

^{1/} Uses of Outlook in Canadian Agriculture, S. C. Hudson and I. F. Furniss, Journal of Farm Economics, Vol. 48, No. 5, December 1966.

It was concluded that in a number of important ways the program did not meet minimum insurance requirements and a model insurance program was developed.

With the serious local, regional and national consequences of drastically fluctuating incomes as a result of yields, it could only have been a matter of time until it became government policy to implement crop insurance. This came about in 1957 or 1958. With the basic research completed, the Economics Branch was able to develop the policy and program quite quickly. By 1959 the Branch had developed the program, working out details with the Department of Finance, the Canadian Wheat Board, the Board of Grain Commissioners, working with the Department of Justice in the drafting of legislation, taking it to a Cabinet Committee and with the Minister to the House of Commons.

A difficult part of the process was in setting up a program which would require provincial government administration but for policy reasons could not be discussed with provinces in advance. The program had to be one which would be acceptable to provinces but one on which they could not be consulted.

Following passing of the legislation, the Branch assisted provinces in setting up their part of the program and negotiated on behalf of the Department agreements with provinces.

Subsequently, programs have been established in seven provinces. Another will likely start next year.

In 1968, 65,000 farmers bought crop insurance coverage amounting to some \$183,000,000. As coverage increases, crop insurance will provide an even greater stabilizing influence in the agricultural economy.



Government
Publications

First Session—Twenty-eighth Parliament
1968

THE SENATE OF CANADA

PROCEEDINGS
OF THE
SPECIAL COMMITTEE
ON

SCIENCE POLICY

The Honourable MAURICE LAMONTAGNE, P.C., *Chairman*
The Honourable DONALD CAMERON, *Vice-Chairman*

No. 11

TUESDAY, NOVEMBER 26th, 1968

WITNESSES:

Science Council of Canada: Dr. Omond M. Solandt, Chairman; Dr. Patrick D. McTaggart-Cowan, Executive Director; and James Mullin, Secretary.

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1968

MEMBERS OF THE SPECIAL COMMITTEE

ON

SCIENCE POLICY

The Honourable Maurice Lamontagne, *Chairman*

The Honourable Donald Cameron, *Vice-Chairman*

The Honourable Senators:

Aird	Hays	O'Leary (<i>Carleton</i>)
Bélisle	Kinnear	Phillips (<i>Prince</i>)
Bourget	Lamontagne	Robichaud
Cameron	Lang	Sullivan
Desruisseaux	Leonard	Thompson
Grosart	MacKenzie	Yuzyk

Patrick J. Savoie,
Clerk of the Committee.

ORDERS OF REFERENCE

Extract from the Minutes of the Proceedings of the Senate, Tuesday September 17th, 1968:

"The Honourable Senator Lamontagne, P.C., moved, seconded by the Honourable Senator Benidickson, P.C.:

That a Special Committee of the Senate be appointed to consider and report on the science policy of the Federal Government with the object of appraising its priorities, its budget and its efficiency in the light of the experience of other industrialized countries and of the requirements of the new scientific age and, without restricting the generality of the foregoing, to inquire into and report upon the following:

(a) recent trends in research and development expenditures in Canada as compared with those in other industrialized countries;

(b) research and development activities carried out by the Federal Government in the fields of physical, life and human sciences;

(c) federal assistance to research and development activities carried out by individuals, universities, industry and other groups in the three scientific fields mentioned above; and

(d) the broad principles, the long-term financial requirements and the structural organization of a dynamic and efficient science policy for Canada.

That the Committee have power to engage the services of such counsel, staff and technical advisers as may be necessary for the purpose of the inquiry;

That the Committee have power to send for persons, papers and records, to examine witnesses, to report from time to time, to print such papers and evidence from day to day as may be ordered by the Committee, to sit during sittings and adjournments of the Senate, and to adjourn from place to place;

That the papers and evidence received and taken on the subject in the preceding session be referred to the Committee; and

That the Committee be composed of the Honourable Senators Aird, Argue, Bélisle, Bourget, Cameron, Desruisseaux, Grosart, Hays, Kinnear, Lamontagne, Lang, Leonard, MacKenzie, O'Leary (*Carleton*), Phillips (*Prince*), Sullivan, Thompson and Yuzyk.

After debate, and—

The question being put on the motion, it was—
Resolved in the affirmative."

Extract from the Minutes of the Proceedings of the Senate, Thursday, September 19th, 1968:

“With leave of the Senate,

The Honourable Senator Lamontagne, P.C., moved, seconded by the Honourable Senator Benidickson, P.C.:

That the name of the Honourable Senator Robichaud be substituted for that of the Honourable Senator Argue on the list of Senators serving on the Special Committee on Science Policy.

The question being put on the motion, it was—
Resolved in the affirmative.”

ROBERT FORTIER,
Clerk of the Senate.

MINUTES OF PROCEEDINGS

TUESDAY, November 26th, 1968.

Pursuant to adjournment and notice the Special Committee on Science Policy met this day at 10.00 a.m.

Present: The Honourable Senators Lamontagne (*Chairman*), Belisle, Grosart, Kinnear, Leonard, Robichaud, Thompson and Yuzyk. (8)

In attendance:

Philip Pocock, Director of Research (Physical Science).

The following witnesses were heard:

SCIENCE COUNCIL OF CANADA:

Dr. Omond M. Solandt, Chairman;

Dr. Patrick D. McTaggart-Cowan, Executive Director; and James Mullin, Secretary.

(A curriculum vitae of each witness follows these Minutes.)

At 12.50 p.m. the Committee adjourned to the call of the Chairman.

ATTEST:

Patrick J. Savoie,
Clerk of the Committee.

CURRICULUM VITAE

Solandt, Omond M., (O.B.E., M.A., M.D., D.Sc., LL.D., F.R.C.P., F.R.S.C.). Born in Winnipeg, Manitoba. He obtained a B.A. in Biological and Medical Sciences at the University of Toronto in 1931. He spent the next two years in post-graduate research under Dr. C. H. Best in the Department of Physiology, Faculty of Medicine, University of Toronto, and obtained an M.A. He took his Doctorate from the Faculty of Medicine in 1936 and was awarded the Gold Medal. He also played on the senior intercollegiate football team. Following graduation from the Faculty of Medicine, he spent a year in research at Cambridge and a year as an intern at the Toronto General Hospital. In 1939, after post-graduate work at the London Hospital, he received the M.R.C.P. (London) and then returned to Cambridge as a lecturer in Physiology and a member of the teaching staff at Trinity Hall. Shortly after the outbreak of war, he was appointed Director of the Southwest London Blood Supply Depot and continued in that capacity until January 1941. He founded the Medical Research Council's Physiological Laboratory at the Armoured Fighting Vehicle School at Lulworth, and became actively engaged in research concerned with tank design and the physiological problems peculiar to tank personnel. In 1942, he turned from medical research to the then new field of operational research and formed the Armoured Fighting Vehicle Section of the Army Operational Research Group. The following year, he was appointed Deputy Superintendent, Army Operational Research Group and in May 1944, Superintendent. He joined the Canadian Army in February 1944 and left the Army in 1946 as a Colonel. In September 1945 he was sent to Japan by the War Office as a member of a mission to evaluate the effects of the atomic bomb. Dr. Solandt returned to the Department of National Defence in Ottawa in 1946 to begin planning for a permanent defence research organization in Canada. This work resulted in the formation of the Defence Research Board in 1947. Dr. Solandt became the first Chairman of the Board and the scientific member of the Chiefs of Staff Committee and Defence Council. In 1956, he left the Defence Research Board to become Vice-President, Research and Development, of the Canadian National Railways. In 1963, he left the CN to become Vice-President, Research and Development, and a Director of The de Havilland Aircraft of Canada, Limited and Hawker Siddeley Canada Ltd., and Chairman of the Board of DCF Systems Limited. In 1966, he left these positions to become Chairman of the Science Council of Canada and Vice Chairman of the Board of the Electric Reduction Co. He was also a Director of the Huyck Corporation and of EXPO 67. Dr. Solandt was awarded the O.B.E. in 1946, and the U.S. Medal of Freedom with Bronze Palm in 1947. He received the honorary degree of D.Sc. from the University of British Columbia in 1947, from Laval University in 1948, from the University of Manitoba in 1950, from McGill University in 1951, from St. Francis Xavier University in 1956, from Royal Military College in 1966, and from the University of Montreal in 1967; and, an LL.D. from Dalhousie University in 1952, and from the University of Toronto in 1954. He was elected a Fellow of the Royal Society of Canada (Section II) in 1948, and an Honorary Member of the Engineering Institute of Canada. In 1956 he was awarded the Gold Medal of the Professional Institute of Canada and in 1961 he received the Civil Award of Merit from the City of

Toronto. He was President of the Canadian Operational Research Society from 1958-60 and a Governor of Sir George Williams University, Montreal, from 1957-63. He was formerly a Governor of The University of Toronto and of the Arctic Institute of North America, and President of the Royal Canadian Geographical Society. He is at present a Trustee of the Mitre Corporation, Boston, a Director of the Canadian Corporation for the 1967 World Exhibition; a Fellow of the Royal College of Physicians in London, and was elected Chancellor of the University of Toronto in 1965. Dr. Solandt was a member of the Western Team at the Conference of Experts to Study the Methods of Detecting Violations of a Possible Agreement on the Suspension of Nuclear Tests, held in Geneva in 1958. Dr. Solandt has a wide variety of interests, including flying and radio. He secured a commercial radio operator's license before entering university and worked as an observer with the Ontario Provincial Air Service. He is married to the former Elizabeth McPhedran of Toronto and has three children; Sigrid, Andrew and Katherine. He is a member of the St. James Club, Montreal, the University Club, Montreal, the Rideau Club, Ottawa, the Athenaeum Club, London, England, the York Club, Toronto, and of Bloor Street United Church in Toronto.

McTaggart-Cowan, Patrick D.: Vital Statistics: 1912, Born in Edinburgh, Scotland. 1913, Emigrated to Vancouver, B.C. 1939, Married Margaret L. Palmer, daughter of J. T. E. Palmer of Vancouver, B.C. Daughter, Gillian Hope, born 1942; son, James Duncan, born 1944. Education: Queen Mary and Lonsdale Elementary Schools, Kingsley School, North Vancouver High School, matriculated 1929; U.B.C. first class honours B.A. in mathematics and physics, graduated 1933, Oxford, B.C. Rhodes Scholar, 1934. Corpus Christi College, Honours B.A. degree in Natural Science 1936. Positions: 1934, Instructor in Physics, U.B.C.; 1936, British Meteorological Office, London Airport, Croydon; 1936-42, Officer in Charge, Meteorological Service in Newfoundland; 1942-45, Chief Meteorological Officer, R.A.F. Ferry Command; 1945, Secretary for Air Navigation for the Provisional International Civil Aviation Organization; 1946-57, Assistant Director, and Chief, Forecast Division Meteorological Service of Canada; 1957-59, Associate Director, Meteorological Service of Canada; 1959-64, Director, Meteorological Service of Canada; 1963-68, President, Simon Fraser University; 15 Sept.-1 Nov. 1968, Principal Scientific Adviser, Science Secretariat; 1 Nov. 1968, Executive Director, Science Council of Canada. Scientific and International Appointments: 1945-59, Member, International Commission for Synoptic Meteorology; 1945-59, Member, International Commission for Aeronautical Meteorology; 1950-51, President, Canadian Branch, Royal Meteorological Society; 1954-56, Councillor, American Meteorological Society; 1960-62, Vice-President, American Meteorological Society; 1960-63, Member, Executive Committee, World Meteorological Organization; 1962-64, Councillor, American Meteorological Society; 1963-64, President, Regional Association IV, World Meteorological Organization; 1963-65, Governor, Arctic Institute of North America; 1968, Governor, Arctic Institute of North America. Awards and Honours: 1944, MBE for services with R.A.F. Ferry Command; 1953, Coronation Medal; 1959, Robert M. Losey Award, Institute of Aeronautical Sciences; 1961, Honorary D.Sc., U.B.C.; 1965, Charles Franklin Brooks Award, American Meteorological Society; 1965 Patterson Medal, Meteorological Service of Canada; 1965, British Columbian of the Year (Newsmen's Club of B.C.); 1967, American Meteorological Society (Fellow); 1967, American Geophysical Union (Fellow);

1967, Centennial Medal (Canada). Sports: Captain, U.B.C. Badminton Team; Captain, Oxford Badminton Team; Rowed for Corpus Christi College, Oxford in Eights, Fours and Pairs (Stroke eight and pairs), Also Tennis, Cricket, Skiing and Swimming. Clubs and Organizations: Honorary President, B.C. Pipers' Association; Honorary Vice-President, Vancouver Art Gallery Association 1967; Vancouver Public Aquarium Association; University Club of Vancouver (Honorary President, 1967); Raleigh Club; Oxford Society; Lions Club (member at large); Men's Canadian Club of Vancouver; Newsmen's Club of B.C. (Honorary life member); Red Cross Society (Honorary Vice-President, B.C. Division for 1967); Big Brothers of B.C.; Honorary Membership, Health Science Historical Society; Member, Burnaby Y.M.C.A. Advisory Board; Vancouver Board of Trade; Alliance Francaise. Scientific Societies: American Meteorological Society (Prof. member and Fellow); Royal Meteorological Society (Fellow); Canadian Association of Physicists (Charter member); American Geophysical Union (Fellow 1967); Arctic Institute of North America (Fellow).

Mullin, James. Born Maybole, Ayrshire, Scotland, November 4th 1939, Education: Primary and Secondary Schooling in Maybole (1944-58) University of Glasgow, Glasgow, Scotland (1958-62). Degree: Honours B.Sc., in Mathematics and Natural Philosophy. Conferred July 1962. Experience: 1962-67, Atomic Energy of Canada Limited Chalk River Laboratories, Chalk River, Ont. Reactor Physicist (1962-1964), Scientific Administrative Officer, Physics Division (1964-1967), Administrative Assistant to Director, CRNL Research (1967) 1967-present, Secretary, Science Council of Canada. Publications: AECL Reports and Translations, and contributions to AECL's ING Proposal only.

THE SENATE

SPECIAL COMMITTEE ON SCIENCE POLICY

EVIDENCE

Ottawa, Tuesday, November 26, 1968.

The Special Committee on Science Policy met this day at 10 a.m.

Senator Maurice Lamontagne (*Chairman*) in the Chair.

The Chairman: Honourable senators, I am sure that we are all very grateful to Dr. Solandt for again making himself available to the committee, and I know that this meeting will also prove most useful to us.

If I remember rightly, at our last meeting we went through part of the policy report of the Science Council with Dr. Solandt and Dr. Gaudry, and I believe we had reached section 5 in our detailed examination. Without further ado I think we should proceed from that point. Are there any questions?

Senator Grosart: I have one on page 25, where they comment in the report:

Yet another problem in the development of science in Canada is the tendency of organizations whose missions have been realized, or which have demonstrably failed to reach their objectives, to follow programs which are diffuse and self-perpetuating.

I notice that later on you suggest one of the answers is a more or less continuing technical audit of these programs. Do you see this setup as a comprehensive audit done, let us say, by a minister with some responsibility in this area, or are you speaking of audits department by department or project by project? Do you see this being an essential element in an overall science policy of the Government?

Dr. Omond Solandt, Chairman, Science Council of Canada: I see the practice of doing this as a very important element in science policy, but I visualize it being done department by department or agency by agency by people who are knowledgeable in the field but who are not committed to that particular department or agency. For, say, the Division

of Applied Physics in the NRC I would see this as a small committee, which would include a couple of people interested in the application of physics in industry and maybe one or two from the universities, who would come in once a year, go over the program and question the relevance of each program.

Basically what you should do is say, "What will the result be if this program is successful?" That is the first question. The second question is, "How likely is it to be successful?" I am quite sure that if this is done systematically in all the applied research groups in the Government—it can be done in agriculture, fisheries, forestry, mining and all the others—it will lead to a continual stopping of programs. Every year there will be a few. It will be a small percentage but over the years it adds up to a great deal.

I think you keep an applied research organization so much more alive and so much more interested and effective if you prune out projects which have obviously failed and are not going to achieve their objective, or whose objective has been bypassed by some other action that may have happened in some other part of the world where somebody else may have found a good answer to your problem. It is amazing how often these things are not stopped; they keep on drifting away from their original mission-orientation towards being more broadly-based research in the same field but not really properly planned.

The Chairman: You make that statement on page 25 but you do not mention any cases. Do you have any examples in mind within Canadian experience?

Dr. Solandt: It is a little difficult to mention for the record, because I do not know that I have any that are carefully documented. I am sure that you can find these in fields like agriculture and fisheries. One minor one which I heard of recently is that the National Research Council has been working on a counter-mortar radar since 1944 or 1945 and

it was just cancelled. I think it was this year or last year. I was in touch with that program many years ago and I know that it would have been better to stop the whole thing many years ago, because first of all interest in the problem had grown less or almost disappeared and the reasons for solving it had changed so much that if you really wanted an answer you should have started all over again. Nobody really wanted the answer, but they kept working at it on a small scale over the years and I am sure that had a bad effect on the morale of the whole group that were working there, quite apart from the expenditure.

The Chairman: You seem to attach a great importance to these committees. I was told some time ago, by a member of the National Research Council, that the work of the board would be reduced only by about 10 per cent if the Council had no labs. In other words, apparently most of the work of the board is devoted to external assistance. They have very little to say about the program within the Council itself. Did you not think that this might be the case also for these kind of audit committees or in different departments?

Dr. Solandt: As far as I know what you say is perfectly true, but this is just the policy of operation of the National Research Council. I have never been on the Council. I speak only from hearsay.

It has been the case that the Council itself has been concerned very largely with the problems of support of research in the universities and the operation of the laboratories has been a very minor part of the activity of the Council. This does not necessarily need to be so. There is no reason why the Council could not take a very active interest in the operation of the labs and I am pretty sure if you question Dr. Schneider about it you will find that his intention is that they should take a more active part and just for the kind of reason I am outlining. One of the functions of the Council proper, which is made up of non-government people, could be to supervise this technical audit that we are talking about.

Senator Grosart: You suggested these auditors might together form an advisory council to the ministry. How do you see this operating? How big a council would this be? If you have auditors in all departments...

Dr. Solandt: Sorry, I would not like to see this too tightly organized as a continuing

operation. I think it is far better that you change your "auditors" quite regularly, because if you do not they soon become dedicated to the things they have approved in previous years and you get back into the same rut you were in before. Any advisor that advises that you follow any particular course of action then becomes committed to that and he is very keen to see that it succeeds. He becomes blind to its defects. I think you want to change your advisors very frequently in order to keep getting an objective new look at the problems.

Senator Grosart: It seems to me that one of our real problems in drawing up our report will be to attempt to try to draw a picture of the kind of mechanism which will be required at the cabinet policy-making level for its science policy. Therefore, we are interested in getting a concept of this advisory council. How big a council would it be?

Dr. Solandt: I am sorry—I have not suggested...

Senator Grosart: Perhaps I could read the paragraph to which I refer. It is in Report No. 4, page 26, paragraph (3) and it says:

...In dealing with departments of government the "auditors" could form an Advisory Committee to the Minister, while for the non-departmental agency they could form either a board or Council...

Dr. Solandt: Yes. I would think that those committees—I think I misunderstood you—I had thought you misunderstood the form—that only one would deal with the whole Government structure.

Senator Grosart: This is the way I read it.

The Chairman: No.

Dr. Solandt: No, I think our idea was that that would be in dealing with a department of Government. You are quite right, the report is ambiguous here.

Senator Grosart: My confusion is in the use of the word "minister". I take it now that you are referring to a departmental minister?

Dr. Solandt: That is right.

Senator Grosart: I was thinking in terms of the minister with responsibility for science policy.

Dr. Solandt: You are quite right, it could be read that way as well. In fact, I am not

ure that is not what it says, but that was not the intention.

The intention was that each departmental minister who had responsibility for science would, in effect, form a small committee which would advise him as to whether the research that was going on in his department was relevant and competent and appropriate to the mission of his department.

Senator Grosart: Taking it in the other sense, do you see any value in this, in the minister, whoever it is, who is responsible for science, and whatever his title might be, having an advisory committee of overall auditors who would audit the decisions, if you like, of the departmental ministries in this area?

Dr. Solandt: I see no objection to it as long as it was advisory, as long as they had no authority. We come back to the point we were at before. I think the Science Council is quite clear that they feel that science in the mission-oriented ministries like Agriculture, Energy, Mines and Resources, Fisheries and Forestry, and so on—science should be an integral part of the program of the department and the decision as to how much science and how it should be applied should be made internally, but with good external advice and competent review—and this is what the auditing panel is suggested for.

I can see no objection to co-ordinating these reviews, either at the level of the minister for science or conceivably the Treasury Board. This would be another very important source of advice to the Treasury Board because if the Treasury Board had access to the reports of these technical auditors, it would give them very good feedback where they could sensibly make cuts or where they could give more money.

Senator Grosart: This is what I had in mind, that you would need something more than an audit within the department; you would need somebody to co-ordinate the results of these audits and then to advise somebody that action should or should not be taken. This system has not so far worked out so well. We are all aware of the problems of the Auditor General. The Public Accounts Committee in the Commons has not met for 10 years, until very recently. The Auditor General is obviously frustrated. Auditors in business sometimes get frustrated.

Dr. Solandt: This of course is a slightly different kind of audit but I agree with you that if the audit is to be effective somebody has to take action in response to its findings.

The Chairman: But if we rely too much on this technique, do you not think that we are again facing a kind of circle, in the sense that these so-called auditors will supervise the research activities of different departments. They will come of course from universities and industry and these departments will offer grants to industry and to universities. And since we do not have too many people apparently in the scientific community in the private sectors, we will again see the customers supervising the benefactors.

Dr. Solandt: This is a very real problem, one that we have never faced squarely and I personally think it is a reason why the National Research Council as a council has not dealt effectively with the laboratories, because the members of the Council are drawn from among those who have been receiving grants from the NRC for support of their research and so they were not free to be critical of the Council's work. As you say, the same thing could happen.

The Chairman: It is more likely to happen if we multiply these committees, because we will find our scientific community will not get larger and then we will have more committees for each department, let us say, which is doing a little bit of research, and then we will have a lot of people sitting on different committees.

Dr. Solandt: Yes, but I think you would be better to try to make a critical review than to throw your hands up and say you cannot do it. However I agree that in selecting people for these committees you should be as careful as you can to get people who are not closely dependent on the department for support of their own research.

Senator Grosart: In a contingent field, I think we had an example of this when we had the Atomic Energy Control Board before us. It seemed to us we discovered that the Board consisted largely of the people who had the responsibility for creating hazards, if hazards were created. They were Atomic Energy Ltd.—Eldorado—I do not think there was a single outside person, but it did seem that the majority on that board were people

who, in broad terms, needed the control if control was necessary.

Dr. Solandt: Your argument is that a board like that should contain a good many people who were not intimately concerned in the field?

Senator Grosart: I think I said it should contain somebody who was "scared"

The Chairman: I think Senator Grosart has a good point when he says that there should be some kind of centralization of this auditing exercise, because if you have people who are relatively far from the individual departments then you are more likely to have an objective and independent view—

Dr. Solandt: Yes.

The Chairman:—than if you put them in all the departments. The two things could be, perhaps, highly desirable—to have the two institutions complementary to each other.

Dr. Solandt: Yes. I think you have very clearly seen the problem and suggested a solution.

Senator Grosart: I think there is an analogy in business, in say a company consisting of a large number of subsidiaries. You have an audit by different groups of auditors for each subsidiary and then the holding company or principal company has its own auditors who may be critical of the other audits but brings them together to create a co-ordinated audit policy. It seems to me that we can read this both ways and make good sense out of it.

Dr. Solandt: Yes.

Senator Robichaud: Mr. Chairman, on page 28 of the report it is mentioned that,

As research in the universities expands, two factors must be considered. First, the universities must be selective in their efforts to expand their research programs.

Further down in the same paragraph it states that:

The joint consultations held by the universities, both of Ontario and of the Atlantic provinces, respecting the future development of research on their campuses are a welcome indication that this problem has already been recognized.

What is happening with the universities from other provinces, the western provinces

and Quebec? Is there consultation of this kind going on there?

Dr. Solandt: I am not intimately aware of the situation. I know that in Quebec, since this was written, they have started such consultations between the university presidents and then, under the presidents, with the people concerned with research. It is not a critical problem in the prairie provinces because there there are still relatively few universities. Even so, they are beginning to encounter the problems there. I think the reason that Ontario and the Atlantic provinces were first is that they have so many more universities. Ontario is now up to 14 or 16 universities.

Senator Grosart: I believe it is 18 universities.

Dr. Solandt: And the Atlantic provinces have a very large number of small universities so that they were faced with this problem earlier. I think it is safe to say that all the universities in Canada see the problem now.

There was, for instance, a good example of this on the prairies where it was decided that another college of veterinary science was needed in Canada and that it ought to be in the prairies. The federal Government said they would give some support to one veterinary college, and the universities of the prairie provinces got together and decided—whether amicably or not, I do not know, but at least they decided effectively that it would be built in Saskatoon. It is now being built there. So this is a good example of the kind of thing that we are referring to.

It has become a very acute problem in Ontario where each university wants to become a completely rounded university with all facilities.

The example of this that I usually use is chemical engineering, where there are now eight schools of chemical engineering in Ontario. They graduated 240 students in 1967. One hundred were from the University of Toronto, 100 were from Waterloo and the other 40 were from the other six schools.

Obviously, this is a very inefficient way of using our resources.

Senator Belisle: Do you suggest, sir, that it would be better if we were to centralize only in two places?

Dr. Solandt: No. You see, with education being a direct responsibility of the provinces,

is far better that it be co-ordinated on the basis of that responsibility. I think it is good the way the Atlantic provinces have got together. Interestingly enough, they have also got the University of West Indies in on their discussions.

Senator Belisle: It seems to be the philosophy of the planning of the Ontario Department of Education, or of the universities, to decentralize, to have fewer universities. I say that because I believe they said they would not grant any more charters.

Dr. Solandt: Yes, but I think there is a tendency now to centralize the planning process in Ontario. This is where the committee of university presidents would come in. As you know, they have just got a full-time chairman, Dr. Macdonald and they are setting out to have the universities decide among themselves the priorities for starting new faculties and deciding which universities will do it. This is on the understanding that if they do not do it, the Government will have to do it and it is better that they should do it themselves.

Senator Grosart: Is this not considerably influenced by federal Government grants from the various agencies?

Dr. Solandt: Yes. I think the federal Government will have to co-operate closely with the provinces in doing this, but this should be relatively easy. That is, if the federal Government decides that they need to support a particular activity somewhere in the country, it is easier for them to consult with the provincial governments to decide where it should be, that is, in which province. The School of Veterinary Science was an example of this, I understand.

Senator Grosart: It seems that a good many of the federal agencies that are getting university grants, and I am speaking particularly of the project grants, are already selecting universities as centres of excellence in particular fields.

Dr. Solandt: Yes. I know that they will be happier when they can select these in close consultation with a provincial authority that has looked at the problem within the provincial context and says, for example, "Yes, if you are going to start a fresh water biology laboratory in our province, it ought to be in association with such an such a place."

Senator Grosart: Are you saying, Dr. Solandt, leaving aside the constitutional question for the moment, that you would advocate an over-all Government science policy for universities, or let us say policy for science in universities?

Dr. Solandt: Yes. I would. But, using "policy" here in the very broad sense of planning for allocation of scarce resources. That is, if the federal Government has only so much money to put in a field—astronomy would be a good example—there should be very careful consideration of where that money goes and to where it would be most effective in the national interest. This is of course a very complex decision. It is not just a simple scientific decision. There are political and social considerations involved.

Senator Grosart: We have, I believe, three different agencies concerned with the problem of nuclear radiation. There is the National Research Council, the Atomic Energy Control Board and the Department of Health and Welfare. Without an over-all policy it is quite possible that, if they were referring their problems to universities, each of these three might refer its problems to a different university. It would appear on the surface to be a mistake, if the decision was not first made to co-ordinate that and turn it over to one or two universities rather than to several—which seems to be what is going on at the moment. There is co-ordination and consultation, but in looking over the evidence we have had there seems to be some reason to believe that there are a good many isolated decisions being made.

Dr. Solandt: This is one of the very real problems that the Committee of the Science Council, under Dr. Gaudry, and Mr. Macdonald's study group are looking at. This is really why we started this study. While it is clear that there is a need for better planning and co-ordination of support of research in the universities, still it involves three levels of co-ordination. There is co-ordination at the federal level to see that the federal departments do not do unplanned, unco-ordinated support; co-ordination is needed at the provincial level to be sure that the federal Government does not do things that cut across provincial plans—in other words, that they support rather than compete with provincial plans; and there is co-ordination required at the individual university level to make sure that

what is done is consistent with the university's own plans for development.

But, really, the message here is that it is clear that we need development of continuing policies at all three levels. Just to give a minor example, when the Department of Energy, Mines and Resources planned to set up their fresh water research laboratory at Burlington, the Science Council privately, not in any publication, urged them to consult closely with the provincial government and with the universities. I think they had no great difficulty in consulting with the provincial government, but it took them three tries before they could get a group of people together who were accepted as the spokesmen for the universities, and the universities themselves had not got together to decide on their policy on this kind of work. As a result of these discussions, the universities of Ontario have got together and have discussed what their policy should be, and so I think there is growing recognition of the problem and growing confidence in dealing with it.

The Chairman: But do you not think that before trying to co-ordinate the others, we should do a little bit of this ourselves? I notice in your report at page 24 you strongly recommend in paragraph (c)

that all mission oriented departments should actively seek to promote industrial and university work in support of each mission.

We have at the present time quite a variety of schemes of assistance to universities from different departments, and there does not seem to be too much co-ordination in this field of activity. As a matter of fact, I am sure you are aware of this recommendation that was made by university teachers some time ago that the Government should have at least some kind of unified committee on grants to universities. Otherwise there is a lot of duplication and confusion, and people can get two or three grants for the same research project. It seems to me we should try to co-ordinate the federal Government first.

Dr. Solandt: This is exactly the area covered by Dr. Macdonald's report which we had hoped to have available in December but I am afraid now it will be February before it is completely written. I expect that this will be a complete and effective treatment of the problem, because it is a very competent group which has been dealing with it, and he

has made a very thorough investigation. However, you are quite right in saying that this is a very real problem.

Senator Grosart: I was passing up the question of co-ordination of industrial research for the moment because I understand, Dr. Solandt, you have some problems of your own in that area at the moment emanating from a source which I think they call "student power".

Dr. Solandt: I do not know that that would be classified as industrial research. They are not distinguished by their industry.

Senator Grosart: I was suggesting that student power seems to have moved into the area of co-ordination of university and industrial research.

The Chairman: Before we go too far from this chapter, could we come back to page 23 where you say that:

"It is recommended that in future every new research or development activity be critically examined at its outset to identify the appropriate organization to carry through the project to its final conclusion."

Critically examined by whom?

Dr. Solandt: There is no central mechanism for examining this kind of problem and so we keep coming back to the same difficulty. To me it appears to be a fundamental problem inherent in our cabinet system of Government that in effect co-ordination between departments takes place ultimately at cabinet level. I personally think we are going to have to evolve some kind of system where there is a staff organization that can do the staff work required to present these co-ordination problems much more lucidly and effectively to the cabinet. If you can visualize a staff organization centrally located, and this could be the staff of a minister of Science or Science Policy—it might deal with this kind of problem, but at present there is no one to deal with it. I think the classic example of this that I was involved in, and I should say here that I am taking off my Science Council hat and putting on my industrial hat, is the big wind tunnel being built out at Uplands which should have been built in Montreal or Toronto where the aircraft industry is located, because that is essentially a tool for applied research and development in the aircraft industry. I do not

think there is any good reason for putting it in Ottawa, but there was no body prepared to look at this critically and say "should it be here, or should it be somewhere else?" I think the failure to do this has affected the whole structure for the scientific community in Canada. We have far more things in Ottawa than we should have had, from the point of view of the national interest as a whole, and here you have to balance the national interest as against scientific interest. From the point of view of the scientists, it is pleasant to have them all together. For that reason the Whiteshell establishment might just as well have been built along side Chalk River, and it would have been very convenient, but I am sure that the Whiteshell establishment in Manitoba is going to pay very great dividends which might not have been the case if you had put it elsewhere.

When we were planning the Defence Research Board establishments after the war we definitely decided we were going to put them right across Canada, and looking back now it was a very wise decision. Take for example CARDE which has had a very great effect on the growth of science and technology in Quebec. They have got much better people there than they could otherwise have had if it had been established somewhere else because they have been able to get the cream of the crop there. This is a very important aspect of scientific planning in a nation like Canada and one we do not have any good mechanism for dealing with.

Senator Grosart: But the Science Council has made some critical examinations. The NG project comes to mind in that regard. Does the Science Council have any right of initiative under its terms of reference?

Dr. Solandt: We have the right of initiative in many matters if we want to exercise it. We have so far not dealt with specific problems, largely because we felt it was wise to get the broad spectrum laid down first. To my mind it is more important to get people who understand a principle like this and accept it. This idea is becoming more accepted, and if you look at the decisions that have been taken in recent years, many of them have been very good from this point of view. For instance, the idea of putting the Institute of Oil and Petroleum Geology on the university campus in Calgary was obviously very sensible; it works more closely with the university. This is a good example of good think-

ing. Even in spite of the absence of a formal mechanism for doing this, we are making a lot of progress.

Senator Grosart: But at the moment we have no one charged with the responsibility of making these critical examinations?

Dr. Solandt: That is right.

The Chairman: Are there any other questions?

Let us consider for a moment your suggestions regarding assistance to industry on page 24. Have you made any special study on our present programs of assistance to industry?

Dr. Solandt: Not an independent one by the Science Council. More than a year ago now, we had a very well prepared report from the Department of Industry outlining what they had done and what they had accomplished, with the periodic progress reports on this.

Andrew Wilson, who is here in the background, who was with the Economic Council and is now with the Science Council staff, has spent a lot of time investigating this problem. So, we feel, on the whole, that the Science Council is pretty well informed about the problem, but it has not done any substantial independent study.

The Chairman: When you say that the federal Government should "support Canadian industrial enterprise by improvement and expansion of existing R and D incentive programs," do you have any things specifically in mind with regard to improvement? Expansion, I understand, means more money; but how could we, in your view, improve our existing arrangements?

Dr. Solandt: The answer to this is long and complicated, consisting of a series of ideas which I really have not got properly organized in the form of a report. However, I will give them to you as well as I can.

Let me begin by saying that this area, the stimulation of industrial research in Canada, is the one in which I personally least clearly see the ideal solution—and I think that is true of the Science Council as a whole. It is easier to see how to improve our activities in science in Government and universities than it is in industry.

The Chairman: And yet this is apparently the big problem?

Dr. Solandt: Yes, I think it is the most important problem, and I think one of our real difficulties is to avoid concentrating our attention on Government and universities, which are relatively easy, and steering away from industry, which is difficult but is the most important problem.

As I see it, what we would like to see in Canada is an industrial community in which there was very active research and development, leading right through to new products, new processes of production of new goods and services, and particularly of ones that are exportable. I think we must begin to put more emphasis on the later stages of this process and less on the earlier ones, and recognize that in fact we do not have to do a great deal of research in Canadian industry to have very technologically competent industry; that if we do design, development and innovation based on somebody else's research, this is just as good and, in fact, may be better.

An example that I may have quoted here before is United Aircraft of Canada, which is a wholly-owned subsidiary of an American company. They have designed, developed and produced in Canada the PT-6 gas turbine which is selling very successfully all over the world, including the United States. They have just completed another bigger one, which is at the test stage now. I am told that they do comparatively little research in Canada, but this is very advanced technology. They are employing Canadians for it, and are doing everything we would like to see in a good Canadian industry, and yet they are wholly foreign-owned.

Really, our problem is not foreign ownership, but to try to get as many companies in Canada, whether Canadian or foreign owned, to use modern technology very effectively in their particular branch of industry. The question is: How can the Government influence that? How can it use its money and its powers of subsidy, in setting tariffs and patent protection, and all the other things, most effectively in order to bring this about?

I do not see any single, obvious answer to this. The incentives that have been used seem to have been effective. I think the General Incentive for Research and Development is probably the most effective, and it has had its biggest effect by inducing foreign-owned subsidiaries to build research labs in Canada and to do part of their research in Canada, just

on the ground it can be done more cheaply here; and I think their experience has been that the quality is at least as good.

The various granting programs—such as the I.R.A.P. program of NRC, of which you have heard, DRB's program, and two or three others in the Department of Industry—are quite effective. They seem to be reasonably popular with industry. Of course, it is very difficult to decide exactly how effective they are.

You would be interested to know that we had a long discussion with Dr. Hornig from Washington on this problem, and it is a thing we do not think of, but the United States does not use any of these incentives; they have nothing of the kind; they have depended almost entirely on their huge contracts, which are predominantly for Defence and Space, and which really affect a comparatively small segment of their industry.

Many of their big industries, such as the steel and the chemical industries, get no Government support for research; and some, such as the chemical industry, are quite progressive, and some, like the steel industry, are very backward. We tend to look on them as a model, that we would like to be like them, but it is quite obvious that their solution to the problem is not even to be considered for us. But, I do think that we must begin to pay more attention to how the federal Government spends its money—whether it is for procuring defence equipment, which is the traditional way of stimulating industry, or for just procuring its ordinary needs such as furniture, buildings, and other things. I believe that we could do a good deal more than we are doing if the Government would make it a point every time it orders anything of putting quality, originality of design, and innovation very high on the list of qualifications, rather than putting low price as the sole qualification.

Senator Belisle: Mr. Chairman, in the light of what Dr. Solandt has said may I ask a question which may not be too relevant, but which has some relevance? In the light of the latest economic problems in England and France, would you agree that increased production is necessary in order for our industry to survive or should we suggest to industry, as you said, that they spend less on quantity and more on quality? Are you optimistic about the markets?

Dr. Solandt: About our policy in respect of exporting?

Senator Belisle: Yes.

Dr. Solandt: Well, yes, I am optimistic, but I agree with you that disturbances in international currencies and international trading relations, could have a disastrous effect on Canada. As you know, we are almost uniquely dependent upon exports. We are far more dependent upon exports than the United States is. Anything that cuts them off, whether it is our own failure to produce good quality at a low price, or whether it is an inability on the part of other people to buy from us, will have a serious effect on us.

Senator Grosart: Dr. Solandt, it seems obvious that in the American system of government vis-à-vis industry the government builds the R and D funding into the contracts, so there they do not need incentives of the kind that we seem to need.

Dr. Solandt: But also many of the contracts themselves are for R and D.

Senator Grosart: Yes, but the mission-oriented contracts have built-in funding for R and D?

Dr. Solandt: Yes.

Senator Grosart: There seems to have been attempted in Canada today the kind of survey that you were asked about. I refer to the publication of the Dominion Bureau of Statistics entitled "Federal Government Expenditures on Scientific Activities: Fiscal Year 1964-65". This is the latest one, I think.

Dr. Solandt: There is another one that is just about ready. Is not that so, George?

Mr. George McColm: Yes.

Dr. Solandt: That is the next one in that series.

Senator Grosart: At page 8 of this document there is a short paragraph which perhaps I can read into the record. I would appreciate your comments on it. It is entitled "Performers of R and D, and it reads as follows:

Most of the funds provided by the Federal Government for scientific research and development continue to be spent for work performed in its own establishments.

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That is the point you have made in your reports, of course.

However, an increasing proportion of R and D funds seems to be used in support of extra-mural R and D. For example, in 1962-63 almost 79 per cent of such funds was allocated to intra-mural R and D, whereas the proportion was expected to be only about 62 per cent in 1965-66. In the past, though, there have been substantial fluctuations in such ratios. The relative shares of both industry and educational institutions have been increasing over this period—that of industry has more than doubled while the share of educational institutions has risen by about 40 per cent.

Is that a trend that you see continuing—that is, the trend you have recommended; the trend from intra-mural research to educational and industrial research?

Dr. Solandt: Well, ideally I think what we would like to see is expenditure in research and development in industry grow most rapidly, the universities next, and then the Government. If we can get these growth rates, then the situation will correct itself over a relatively short time. As I see it, the problem is to get a high rate of growth in industrial R and D.

Senator Grosart: How likely are we to run into more serious problems such as—I am not being critical—the Canadian General Electric pull-out from reactor development? Is this an isolated case, or are we likely to find industries shying away—particularly Canadian subsidiaries of American firms—from large scale investment in industrial research in Canada?

Dr. Solandt: This is a very difficult question to answer, but let me say that as I see it, nuclear power has been one of Canada's major programs. We have never called it that; we have never necessarily looked upon it in that way, but it is one of our major programs. The total expenditures are approaching \$1 billion, as I recall the figures. If you look at it as a complex program, going right through from fundamental research to production and use, you will see that we are in difficulties at the production and use end. These difficulties are due to the fact that we have never been able to effectively transfer the technology from government to industry, as was done in the United States. I think that

that failure has been due partly to the fact that we did not have in Canada a Canadian company that was willing to take on the job of using this technology. To my mind, the choice of C.G.E. for this task was an unfortunate one, because the parent company is deeply involved in a competitive range of reactors. It seems to me that that could have been foreseen; that there would have been difficulties over this. I am being wise after the event, but I think we would have been far wiser to have found a Canadian company, but there was not one. Nobody expressed any interest in it.

Again being wise after the event, I think it would have been very sensible for the Canadian Government to have tried to stimulate—well, to have subsidized, if you like—the formation of a Canadian industrial complex to undertake this job.

We have got to watch this very carefully in the future and be sure that we do not have our efforts to convert science into effective economic gain frustrated by not having in Canada the right industrial organization to complete the development. You see, we have the industrial competence. Canadian industry can do this. It has demonstrated it can do it. But, in the case of C.G.E. the difficulty that we ran into was that the company is owned in the United States, and is run by a company that would have been competing with itself in this field.

Senator Grosart: And there was also the problem here of international marketing?

Dr. Solandt: Yes.

Senator Thompson: I notice that we have mentioned the stimulus of government in the way of grants, tariffs, and patents. Is the limitation on the issue of patents in Canada, and having them issued in the United States, part of this picture?

Dr. Solandt: I honestly do not know how important a factor it is. There is no doubt that it is a factor, and some of the industrial members of the Council have been suggesting that we look more carefully into not just competence, but performance and all the non-technical factors that substantially influence the use of science and technology.

Mr. Wilson, do you want to say anything on this? Would you like to add anything?

Mr. A. H. Wilson, Science Adviser, Science Council of Canada: I do not think so, sir.

The Chairman: At the bottom of page 24 you say that in certain cases 100 per cent funding will be necessary because it is done in other countries. In what other countries is this done at the moment?

Dr. Solandt: It has been done in the past, particularly in the aircraft industry, in the United States, Britain, France and Germany, and our competitive aircraft industry has never had as an extensive a subsidy as its competitors. It has also been done to some extent in some fields of electronics, but here, in at least some cases, Canadian industry has had as good a subsidy. When you say 100 per cent funding, what you really mean is that the Government buys the first two or three prototypes and just pays for them. Of course, in most cases it has been done because it was an aircraft or electronic equipment wanted by the military.

The Boeing aircraft is a good example, where the development costs of the 707, for instance, were paid for by a major order for tankers for the U.S. Air Force, and they were the same aeroplane except that they did not have windows and a few other trimmings. All the basic work was bought and paid for completely by the Government. It is almost impossible for anyone to compete against that sort of subsidy, so the point here is that when we are deciding what we want to do in supporting research and development in industry we must look at what the industry has to compete with. It is no use giving an inadequate subsidy that will not be effective. We should either give none or give enough to be effective.

Senator Grosart: Do you think there is an try of Technology use this prototype-purchasing funding method quite extensively now?

Dr. Solandt: Yes.

Senator Grosart: Do you think there is an area in which this might be developed in Canada?

Dr. Solandt: Yes, but this is a very dangerous technique. I know that some people in the British aircraft industry feel that lack of success in recent years has been due to the choice of prototypes by government officials rather than by people in the industry, because if the government is paying for the construction of an aircraft it is very likely to decide

what kind of aircraft it should be and how it will be designed and built.

In De Havilland, with whom I worked for a while, the story they always liked to tell was that their greatest success was the Mosquito, but they did not even tell the Ministry of Aircraft Production that they were designing it until after it was flying, so they got no interference at all and produced a successful aircraft. I think this is a very real problem.

Senator Grosart: The danger being that the procurement decision may be a political rather than a marketing decision.

Dr. Solandt: Yes. Decisions in this field must be market oriented. This, of course, is another of our problems in Canada, that we have to be very conscious of markets and design for markets rather than design and build something that we find interesting to do.

Senator Grosart: If we had better luck it might be a good reason for staying in NATO.

The Chairman: No politics, please!

Senator Grosart: I qualified it, Mr. Chairman.

The Chairman: At the top of page 25, it seems to me we again face the problem we discussed a moment ago, where the report says:

The Science Council is anxious to ensure that all important areas of scientific activity are considered for support, so that available funds are used as wisely as possible.

I suppose you would agree that at the moment there is no mechanism to do this?

Dr. Solandt: No, but I think that in the fairly near future our reports will make a substantial step in this direction. That is, the report on university support emphasizes the whole scope of research in universities and looks particularly at areas that are not getting support and discusses how to ensure that all areas are at least considered.

The Chairman: But considered by whom?

Dr. Solandt: This report will recommend a mechanism for considering this from the university support point of view, but this does not solve the total problem that we keep coming back to.

The Chairman: On page 26 you state your general principles for the future and say:

All Federal Government scientific organizations should be mission-oriented and should be engaged principally in applied research and development.

How do you see the role of the National Research Council in all this?

Dr. Solandt: The National Research Council has only two divisions that are not mission-oriented, or that are not doing applied research which could be and should be mission-oriented. Much of it is, some of it is not. These are the Divisions of Pure Physics and Pure Chemistry. Being wise after the event, I am doubtful whether they should have been formed. Now, it is heresy of the worst kind for a scientist to express this view. I think there is no doubt whatever that they have made a major contribution to the development of science in Canada and I do not for a moment want to suggest anything that would detract from the credit due to them. However, I personally think they would have been more effective had they been set up in connection with one or more universities, because that kind of institute, a pure science institute, produces both new knowledge and new students, by which I mean new scientists if it is in connection with the university.

The NRC view, which I think is quite right, is that they in fact train a good number of post-doctoral students in the Divisions of Pure Chemistry and Pure Physics. My argument would be that if they were in universities they would attract people into science whereas now they just have people who have been attracted by someone else. They are such an important and successful element in our scientific community now that I would strongly urge that they continue to be supported, and supported really adequately, that we continue to look critically at the quality of their work, which has been very high, and that we try to establish closer links with the universities, although they already have pretty good links.

The Chairman: So you think most of their activities at present are mission-oriented but they have several missions?

Dr. Solandt: No. I think that most of the activities in the NRC are in applied research. Many of them are mission-oriented and I think all of them should be. I think there is room for redefining the goals of many elements in the NRC and again I am sure if Dr.

Schneider were here he would agree with this. I am very hopeful that the NRC will play a major role in some of the major programs that we have discussed, the mission-oriented programs, because by doing this they will then become involved in scientific activities that go right through the whole scientific community.

Senator Grosart: When you speak of NRC mission oriented projects, are you referring to the referral projects or projects that have been initiated within NRC—naturally both I suppose. What is the percentage; do you have any idea?

Dr. Solandt: No, I have no idea, but by far the greater part of their work is initiated within the NRC itself and really starts from their understanding of new opportunities that arise out of scientific discovery.

Senator Grosart: Rather than looking to a problem that exists and seeking a solution for the—

Dr. Solandt: Yes.

(Short recess)

UPON RESUMING:

The Chairman: Any other questions on Chapter 5?

Senator Thompson: I would just like to raise the question or follow up on Senator Grosart if I could. On page 27 you are saying that we have got to have this concerted effort to encourage the training of people into science. I have some concern about the attitude of the students toward science. I look at a gentleman like yourself and the remarks that are made, which are so out of character and yet I think it is symbolic of an attitude of young people towards becoming impersonal and a sense of frustration towards our whole technological community, which may go to the extreme of hippies and so on. I wonder if there has ever been a study done of the attitude towards science of young people who are planning to go to university. I have a feeling, if I may express this, that some look at atomic bombs and other things and this is almost like going into the league of Satan to develop and go into science. I have a suspicion that some really able minds on some moral grounds are not going into science.

Senator Grosart: Writing poetry.

Senator Thompson: Probably writing poetry.

Dr. Solandt: There is no doubt that this tendency is being observed. It seems to be a little more evident in Britain and the United States than it is in Canada. I have not seen the figures for registration for 1968 but up to then there had not been much change in the percentage of students going into science and engineering in Canada in recent years. There has been a decline in the percentage going into engineering and an increase in the percentage going into science and I think some change in favour of the biological sciences as opposed to the physical sciences—is that not about right?

Dr. McTaggart-Cowan, Executive Director of the Science Council: I think I could amplify that. I had a study done on this trend, particularly in physics and chemistry throughout the western world. There is no question but that the percentage enrollment in physics is dropping in every country in the western world and is still rising in the Soviet Union. These were firm figures. Chemistry has been less spectacular, but that is the trend. The life sciences are going up fast, but on balance it is steady. Engineering has fallen but there is an indication now that it is past the bend and coming up.

Senator Thompson: Was there a reason for physics falling off?

Dr. McTaggart-Cowan: Yes. The general student attitude. Here one relies on the social sciences surveying the individual science student's attitude and the science students are not always tuned in with the social sciences. They have a falling off in physics and chemistry, which results from an attitude which is two-fold—one, that in high school they are looked on as tough subjects and therefore the system and the administrations of the schools tend to encourage students away from these tough subjects, so that the school gets a high rating. This is being mitigated but it is still there.

The other is that the students themselves feel that the life sciences are constructive and that physics and chemistry are not constructive. This is a general attitude, the glamour of the new research findings in the biological sciences, the DNA molecule and the like, that have been written up so well in *Scientific American* and *Fortune*. They have captured

the imagination, that these research fields are forward and looking into a greater understanding of life and therefore you have this major swing in enrollment.

Dr. Solandt: Another point is that mathematics has started up spectacularly. Waterloo, for instance, has 1,700 students in the faculty of mathematics now; it is getting comparable in size to their engineering school, which is about the biggest in Canada. Dr. Petch was telling me that at a recent conference on mathematics which had been held in the United States, it was decided that if the trend continues, it will be only two or three years before more people will be taking mathematics than are taking physics and chemistry combined. Why mathematics? Locally in Canada I think it is because of the great opportunities for people both for employment and for interesting careers in mathematics, in relation to computers. I think this is what stimulated it. These are not fundamental mathematicians: they are applied mathematicians.

Senator Thompson: Taking your second point, about being non-constructive, what do you do about that? What bodies do something about it, in order perhaps to clarify this misconception to the student?

Dr. McTaggart-Cowan: I think the approach has to be made to the students in the high school, because these are ideas formulated before they come to university. The Canadian Association of Physicists and other professional groups, universities, internally, have and are mounting programs to go out to the schools to talk about modern physics and modern physics research, to try to undo the damage which the association of the nuclear bomb directly with physics has done in the minds of at least two generations. There is plenty to talk about. It is a misconception of modern physics and modern chemistry, but it is going to be undone only by the faculty of the universities in physics and chemistry getting out to schools and talking and demonstrating—in my judgment.

Senator Thompson: Thank you.

Dr. Solandt: Might I add a word. I do not think that we should be desperately concerned about these changes in emphasis. It seems to me to be quite clear that if we are to continue to have a happy and productive and pleasant society in the world, we have to

begin to learn more about people and how they work together and about social organizations. I am not at all unhappy to see a swing of support toward the social sciences to try to bring them along faster in order to work closely together with the natural sciences.

I think that part of the swing away from physics and chemistry is a feeling that they have been responsible for the atomic bomb and for television and jet transport and many of the things that obviously are producing the change which is upsetting our social structure.

I do not think we are going to solve our social problems by slowing down change but can solve them by finding out how to live with the change. But these changes in balance which are interesting the scientific mind are good, if they follow the needs that society perceives at the time.

Senator Belisle: You have just said that there was a fairly good trend or move toward mathematics. Knowing that we need so many credits to get a degree, I am curious to know what other subjects they are taking besides mathematics. Are they walking away from history and from the languages?

Dr. McTaggart-Cowan: Perhaps I can try to answer that, Mr. Chairman. The major area of increase in enrolment is in the social sciences, particularly in political science, sociology and anthropology. These are increased. The humanities, with some aberrations, are holding their own or perhaps decreasing. I would say, therefore, that the increase in enrolment in mathematics is coming in part from those that might otherwise have gone into physics or chemistry and in part from the humanities. It may sound stupid, but modern mathematics of the purest sort is very close to the humanities. The mathematical logician of the pure sort really only talks to the philosophical logician. So I think it is coming from the two ends of the spectrum with a major build-up in the social sciences.

Senator Belisle: But the humanities are still holding their own.

Dr. McTaggart-Cowan: It is a checkered pattern. Philosophy and history are extraordinarily poorly represented in enrolment in Canadian universities. You can follow this in the pattern of the enrichment of grants for graduate students, and this comes back to Dr.

Solandt's remark that the slow trend to improve the position of the social sciences in grants support needs quickening, because they are central to the solution of many of the problems that society is grappling with.

Senator Belisle: Thank you.

The Chairman: In the middle of page 27 of section 5 you say:

However, it must be recognized that traditional government departmental structures and procedures were not designed to accommodate scientific activities, and there are administrative complications inherent in operating a research establishment within a Public Service environment.

What do you have in mind there? Do you envisage separating mission-oriented research from the department? Do you have in mind an arrangement such as they have in defence, with the Defence Research Board closely associated with the department but still having greater independence and greater flexibility in so far as its administration is concerned? Or did you have anything specific in mind at all?

Dr. Solandt: I should begin first of all by saying that I am biased in this field, having been the founder of the Defence Research Board. It has always looked pretty good to me. I should also add that this paragraph in the report was written and rewritten many times. What we have put in was the result of a great many discussions which it would have been interesting for you to hear, but they are too long to rehearse. The consensus of opinion which is in this paragraph is that the Government departmental structure is not a good one for scientific research. Originally we had this drafted to say that you really must have some different structure for research, something like a Crown company or a separate board, but after a good deal of discussion we concluded that the administration of departments in the Government has changed so much and the Public Service Commission has changed so much in the 20 some odd years now since the Defence Research Board was formed, and other similar organizations such as the Fisheries Research Board and so on, that it should be possible now to devise and run a pretty good research organization within a departmental structure.

I think there are still problems. The principal problems used to be twofold. First of all

there was the problem of personnel. It used to be that you could not go out and offer a person a job. Usually, the person you want for a job is somebody you identify and say, "That is the man I need to do the job I want done." If you say to him, "Will you please apply to the Public Service Commission and put in 17 copies and a lot of different forms," he will say, "I thought you wanted to offer me a job. I am not looking for a job." This was one of our problems in D.R.B. It is one of the reasons we set up separately. We could go out and recruit people.

The Chairman: You could recruit them for a certain period of time, for instance.

Dr. Solandt: But the Public Service Commission is now willing and able to do this. So this disadvantage has disappeared. Promotions and selection of staff are a problem in that you want this done, if possible, by other scientists.

The Chairman: And salaries would be a problem.

Dr. Solandt: And salaries and so on.

The Chairman: Salaries would tend to be lower, I presume, in the Public Service.

Dr. Solandt: The Defence Research Board had and still has a selection committee made up of outside members. You will recall that Mr. Houlding, the President of R.C.A. Victor, was here as chairman of their selection committee. Having an industrialist there together with people from universities, you tend to get some equalization of salaries. They would say, "Well, if this man were coming to work for my company, I would offer him so much money."

The other problem, which again is quite soluble now within a departmental organization but was not 20 years ago, is financial flexibility. If you have a research organization in which you have to specify in advance what project you are going to put the money in, but cannot move that money from the project to another project, then you are bound to be in real difficulties. We used to watch with amazement the way this was done in some of the United States Government laboratories, where research workers would have money to do a project, but halfway through the year would find that it was not

good project and would want to go to something else but could not use the money.

Again this is soluble. I think, really, the answer is that, if you have good management in your departments right from the top down and use all the flexibility that is available now in the Government mechanism, you can run a pretty good research organization within a departmental structure.

There is no doubt that for a "biggyish" group like the Defence Research Board, the structure they have is very effective and is, I think, a good one.

The Chairman: Are there any questions on section 6?

Senator Grosart: Dr. Solandt, I have really the same question that I asked you in connection with section 5, which arises out of your recommendations starting on page 32, where you are dealing with the approach to major programs. Again you suggest an advisory committee. This time I think it is quite clear that you are referring to the departmental minister, and you go beyond that and say where several departments are concerned there should be an over-all agency. Would not this function be served by the same audit committee? The audit committee is looking over all projects. Now, do you need a separate committee to look at major projects? Again I am coming back to the question of mechanism, and I am trying to find as simple a mechanism as possible for the control of the federal Government component in R and D.

Dr. Solandt: The committees we are talking about here are concerned with guiding the actual conduct of the major program, and of course should be concerned with the quality of the work being done and the relevance of the work. I would say that if these committees worked in the ideal way, then you would not need to have the audit of work that was under their guidance. The work under their guidance to begin with would be a very small proportion of what is going on in the Government. But it would be an increasing proportion.

Senator Grosart: You see this as an operational advisory committee?

Dr. Solandt: Yes.

Senator Grosart: Do you see them as similar to the committees you have in the Science

Council? You have projects committees in the Science Council?

Dr. Solandt: Yes, but we do not do any operations. The Science Council is not responsible for any operations.

Senator Grosart: I am now merely dealing with research operations. In the Science Council your operational area is the assessment of projects. My understanding is that when you let out a research project, then you set up an advisory committee to oversee it.

Dr. Solandt: Yes, but this is to oversee an investigation, not an operation. For instance, our recommendation on water resources is that we have an advisory committee. It is recommended that the existing national committee be reconstituted and given slightly different terms of reference in order to guide that program, but in this case we would visualize this committee, for instance, discussing in some detail how much money is needed for each particular part of the program each year, and advising the minister on how actually to conduct the operations of the program for the ensuing year.

Senator Grosart: Would it not see a similar advisory committee attached to the responsible ministry in the cabinet?

Dr. Solandt: No, this committee would be responsible to the minister.

Senator Grosart: But to the departmental minister. I am coming back to the same question I raised before. Do you see an over-all advisory committee?

Dr. Solandt: Yes, the Science Council. I would envisage if you had a minister of Science Policy, the Science Council as such would—I would not say disappear—but it should transfer its allegiance and it would be advisory to him.

Senator Grosart: Would there not need to be a full-time council?

Dr. Solandt: I do not think so if it had a competent full-time staff. I would envisage the purpose of the council as being really to bring a dispassionate judgment to issues that would be raised and clearly portrayed by the staff. It seems to me that the purpose of having an organization like the Science Council is to try to bring to bear on national problems the views of people who are not deeply im-

mersed in them on a day to day basis, but who can look at them from a different perspective.

Senator Grosart: Perhaps my difficulty is that I do not see the political decision-maker needing much more in the way of advice. But I do see him needing helpful direction. That is why I have a suspicion of the use of advisory committees at this top level, but I do not know what we can substitute for them. No political decision-maker is short of advice, in my opinion. He needs something else, and this is what I am trying to get at, if he is going to make valid decisions.

Dr. Solandt: I think the staff would supply the kind of thing you mean, and his deputy minister would really be the key person in the kind of effective advice I think you are talking about.

The Chairman: Any questions on Section 6?

Senator Thompson: I was looking at your goal of world peace and relating it to the number of criteria that must be met. I am thinking of your approach to foreign aid in order to tackle the question of poverty and hunger. I am not sure in your criteria whether you do not keep emphasizing the need for industry in Canada. Perhaps I should not say "emphasizing", but I wonder if they both match.

Dr. Solandt: Well; I certainly feel very strongly that a contribution to world peace and helping the "have-not" nations is in the enlightened self-interest of Canada, and I would regard this as expenditure for Canada although not necessarily in Canada. Is that your point?

Senator Thompson: My point was, and I just briefly looked at it—that Section 4 of the criteria that must be met, you emphasize new industries and you say they must come into being and get established on a viable footing. I presume you meant in Canada. It seemed to me this might eventually arise with developing nations and with trade, but if you are going to speak by that criteria, you might limit some of the work you are going to do on a long-term basis in research with respect to world famine.

Dr. Solandt: There is no doubt that the whole report is full of conflicts. That is to say, a great many of the stated goals and

criteria are conflicting, and the problem of policy is to decide just how much of each you want. I think, as I illustrated before, even the apparently simple goals that the Economic Council have set in economics are completely conflicting. That is to say that you could not achieve them all at once. For example, the obvious one of stable prices and currency and full employment are just about impossible. You can easily get, or perhaps I should say you can more easily get one or the other, and similarly with all these things. There is no doubt if we want to help the "have-not" nations we are going to have to restrict our own growth in some areas to avoid competing with them. We are going to have to buy things from them that we could from the pure view of monetary gain make here. This is one of the compromises we are going to have to make. I think the wealthy countries of the world are going to have to make much bigger sacrifices in the future than they have been willing to make in the past.

Senator Thompson: In your concept of setting up a commission to handle a major project, just taking this factor of world famine, would you give me some idea who would be included in that commission? It would be the Department of Agriculture, or their research division, I presume; or would you set up a commission?

Dr. Solandt: We have not really defined our mechanism of action here adequately. This is one of the things we are starting to work at now. As far as the Science Council has gone...

The Chairman: Do you not think you will be a bit late?

Dr. Solandt: We are going to be late with everything.

The Chairman: But in this specific case? The Government has already announced that it would set up a research institute or council on external aid.

Dr. Solandt: Yes, but we have been in touch with Mr. Strong and others there, and our idea is that their initiative may in fact become what we are thinking of, as long as incorporated in it is good science.

We had never envisaged we would set up a separate scientific activity in foreign aid, but we want to try to make sure that science is used in foreign aid wherever it can be help-

ful. One of the most helpful fields is to find out how best to transfer to developing countries the technology they need. Developing countries do not really need to do much research and development, because nearly all the technologies they need for the foreseeable future are available in other countries; but experience has shown that it is desperately difficult to transfer an advanced technology to a relatively primitive people.

What we see as the big problem, where science can help, is to find out how best to transfer technology and to ensure that, as needed, it is transferred to the underdeveloped countries. We do not envisage this as a separate, purely scientific venture; we are looking at getting science into all our activities in the field.

Senator Grosart: The Russians seem to be far ahead of us in this transfer of technology to the developing countries.

Dr. Solandt: I am not quite sure how effective they are. When I say that, I am not suggesting they are not effective; I just do not know how effective they are.

Senator Grosart: On a cursory reading, one gets the impression that the order of effectiveness in technological transfer to developing countries is pretty well Russia, China and Israel, all of whom have a policy of transferring technologies. We do not seem to be doing this to the same extent in the rest of the western world, leaving out Israel.

The Chairman: I understand that this proposed centre would be set up specifically with this idea in mind.

Dr. Solandt: Yes, and our idea is that quite likely our major program would be merely to get the whole-hearted backing of the scientific community in Canada behind this development agency.

The Chairman: The committee might consider at a later stage whether we should hear Mr. Strong on this subject. I think that he would be very happy to come before the committee to explain what they have in mind in creating that centre.

Senator Grosart: I know that he has a program in mind.

The Chairman: Yes, this was announced in the Speech from the Throne.

Senator Thompson: Prior to this announcement, from looking at your report *Towards a National Science Policy for Canada*, you placed a lot of stress on this in No. 5 of your "National Goals". What were you planning to do with respect to this? Were you going to set up a commission?

Dr. Solandt: No. We have always envisaged we could just work with—I was going to say the "External Aid office," but it is now the International Development Agency, is it not?

The Chairman: Yes.

Dr. Solandt: All we wanted to do was to ensure that they used science as effectively as possible, and we would do what we could to help them get the backing of the scientific community.

Senator Thompson: I had sensed that the Department of Agriculture is attending various international committees and is thinking of sending a team over. This is in the report it presented to us. I was wondering, apart from agricultural scientists, how our whole approach is being co-ordinated in helping the underdeveloped countries. Is there a central body through which representation from the various departments in scientific research is funnelled to work in the underdeveloped countries?

Senator Grosart: Are we on No. 7 now?

Senator Thompson: I was finishing on this.

Senator Grosart: I just wondered.

Dr. Solandt: Most of it is funnelled through Mr. Strong's agency. In the scientific field there is a fair amount of direct aid—for instance, with regard to relationships in scientific work between many individual universities; there are two or three agencies that are sending out people to help with management and research; there is a group of scientists that is very active up at Chalk River, to do research, and you have probably read about their work.

The Canadian National Railways, for instance, has sent half a dozen teams to developing countries to help on railway problems, largely through the World Bank. So, there are many different channels.

When this agency gets started, I hope that we can get the work better centralized, so that we can get a better picture of how much we are doing and how we could do it better.

The Chairman: Even within Government, several federal departments have their own program. For instance, Health and Welfare have their own program to assist underdeveloped countries. I do not know how this is being co-ordinated at the moment.

Dr. McTaggart-Cowan: There are the specialized agencies of the United Nations, concerning which Canada is a signatory to the various treaties, and there the responsibility is normally delegated to a particular department, in consultation with External Affairs, and this provides another avenue of direct participation.

The Chairman: In any case, if we invite Mr. Strong, I am sure that he will be in a better position to answer these questions about co-ordination in that specific field.

Dr. Solandt: Naturally; yes, he would be.

The Chairman: Section 7, on major programs?

Senator Grosart: I have a question, Mr. Chairman. At page 36, talking about prototype major programs, I do not understand the sense in which the word "prototype" is used, or what a prototype program is. However, my question relates to the phrase "systems of organization and co-ordination which have been proposed". What systems of organization and co-ordination have been proposed? What has this reference to? Is it a reference to what is proposed in the report?

Dr. Solandt: Yes, they are proposed in the Space Report and the Water Resources Report. Each has a proposal in it for a mechanism of organization and co-ordination.

Senator Grosart: Would you give us a brief description of that?

Dr. Solandt: Well, very briefly...

Senator Grosart: Can you call it a system?

Dr. Solandt: Well, an organization. Briefly, we state in the case of space that because there are so many different departments concerned, each with some very valid and important interests in space, the only way to get a coherent, well-planned and integrated space program is to set up a space agency which would not be in any one department, but which would be responsible for formulating a national space program, and administering it.

Probably, the performance work could be spread around departments as it is now, but the agency would be responsible for the co-ordinating and planning of the program.

In the case of water resources we considered that since responsibility for co-ordination had already been assigned to the Department of Energy, Mines and Resources, and since their interests and concern with water was the dominant one, although many other departments are very much concerned in it, it would be better, rather than recommending the setting up of a new water agency, to recommend that the major program in water resources research should be co-ordinated within the Department of Energy, Mines and Resources by a committee which already exists, but which would require some alteration.

The Chairman: As a supplementary question I should like to ask to whom the agency proposed for space, for instance, would report?

Dr. Solandt: I have forgotten whether we made a specific recommendation in that respect.

Mr. J. Mullin, Secretary, Science Council of Canada: There was a reference to a specific minister to which that agency might be responsible in an earlier version of the report, but this was removed from the final version.

Dr. Solandt: Yes. We had so many conflicting ideas. This is a perfect example of what you are—in fact, although your questions are coming around to this again, we keep coming back to the need. The truth of the matter is that there is no one in a position to take a recommendation such as this, and convert it into action.

Senator Grosart: That is why I made the remark that it sounds to me rather like a pious hope. There just is not a system of organization and co-ordination at the moment, and it seems to me that we talk too much about co-ordination and not enough about control. I might read to you a comment that appeared in the *Financial Times* of May 6, 1968. It was made at the time of your Council's report on ING. This article says that you are apparently recommending an annual expenditure of 2 per cent; that the prediction you make is that if ING is to go ahead it will be on the assumption that the total federal Government's expenditure would rise from

1.3 per cent to 2 per cent. Referring to the Science Council, the article says:

It (the Science Council) is calling for huge "directed programs" which will relate "to the social needs of the Canadian people or to the strength and productivity of the Canadian economy."

It leaves open, however, the question of how these programs will be directed, and what controls need to be established to see that this vast investment in science is not wasted.

This brings me back again to the question: How do we get control of policy-making, operational expenditure, and an effective technical audit? This article says that you have left this question open.

Dr. Solandt: Yes, we are talking now just about these factors in relation to science, but we can just as well have the same discussion in relation to economics, or in relation to any other problem. The truth of the matter is that there is no central mechanism for co-ordination except the cabinet, and the cabinet cannot deal with the level of detail that we are talking about. The problem that faces the country is a fundamental one of Government organization, and the Science Council has hesitated to recommend a complete reorganization or a complete change—well, a prospective change in the structure of Government organization—but maybe we should.

Senator Grosart: This is my point. I think you should, and I hope you do before we have to do it.

Dr. Solandt: I was going to say that I rather hoped you would do it first, because you are in a much more influential position to deal with problems of this kind than we are.

Senator Grosart: It has been said, for example, that the Economic Council was forced to move into a vacuum in respect of setting certain national goals which are apparently beyond its terms of reference.

The Chairman: No, it is right in their terms of reference.

Senator Grosart: I said that it has been said it has had to do that. I will not go beyond that.

The Chairman: I wrote the act.

Senator Grosart: Then, I bow to your opinion. But, it has moved into an area that at

least goes beyond the name "Economic Council". It is talking about social goals, and relating them to the economy. I am again suggesting that if this vacuum exists in the area of federal Government science policy then somebody has to come in and fill it. This is my point.

Dr. Solandt: Yes.

Senator Grosart: To what extent do you see the Science Council itself filling that vacuum?

Dr. Solandt: It is not in an effective position to do this because it is not an executive body. It is now split off from the Science Secretariat, and has no administrative connection inside the Government. That is why we cannot take the action necessary to form a space agency.

Senator Grosart: I think you have put your finger on the whole problem, Dr. Solandt, by using that phrase "an executive body". Yet, all the recommendations we get are for advisory committees. Surely, what we need in this area is an executive body, and that would seem to me to mean a minister of science, or of science policy. Is that a fair conclusion?

Dr. Solandt: Yes. I think all the discussions of the Science Council are coming around to the view that we need a minister for science policy, but I wonder if we do not need ministers for policies of other kinds as well. I was suggesting to Senator Lamontagne that you might get Dr. Okita, when he comes, to tell you about the organization in Japan. I think it is a very interesting model that we might well study.

The Chairman: I think that at the press conference when you issued that report you referred to the desirability of having a minister generally responsible for this area, but you said he should be a minister without portfolio. What do you have in mind there? Do you mean that he would have nobody responsible to him?

Dr. Solandt: No.

The Chairman: He would have no services?

Dr. Solandt: I think it was Dr. Gaudry who said this, and his use of the term "minister without portfolio" arose from the discussion we had just had with Mr. Drury, in which he was using the term "minister without portfolio" to mean a minister without a department.

The Chairman: But it might be a department?

you give it to the National Research Council, what about covering also the social sciences?

Dr. Solandt: Well, it would be a very small department. I cannot see how any minister could function effectively without a good staff. Really all you mean here is that you want a minister who has a good supporting staff, but since he will have no large operational responsibilities he will not mean a big department; 50 people perhaps.

The Chairman: Suppose the idea of setting up a kind of national centre on scientific and technological information is accepted. Do you think this kind of service should go there?

Dr. Solandt: I think the National Research Council could run it very well. They have a good science library.

The Chairman: If the National Research Council does this, then Health and Welfare is doing it at the moment too, everybody is involved in general scientific and technological information.

Dr. Solandt: Oh yes, but what I meant was that if you had a minister for science policy he and his staff would work out the best way of organizing a national information centre, and then they would see that the necessary organization was established, budget allocated and so on, but they would not themselves continue to run it, because if they did the national information centre would start to get all the money and there would be no money going to other things.

The Chairman: Why?

Dr. Solandt: Because it was run by that department. This is what has happened in every place where they have set up a minister for science policy. In France, for instance, the minister was the delegate general; he was concerned with science policy, advising the prime minister directly; then he was given responsibility for space and atomic research; all the other work, such as the universities, was still in the Department of Education, so he ceased to be a general adviser to the government on science and became just the adviser on science and space. In effect, they destroyed the organization they had set up by giving it responsibility for operating one part of the scientific activity of the government.

The Chairman: But how could you centralize this information service in one place? If

Dr. Solandt: We have the example of the Dominion Bureau of Statistics. It centralizes statistics for everybody. There is no reason why you could not have a similar agency for information.

The Chairman: Which would not be attached to any research agency?

Dr. Solandt: I agree.

The Chairman: Otherwise, if this argument is true, the information would tend to be biased towards the activities of the National Research Council.

Dr. Solandt: I agree.

The Chairman: They would neglect other fields, and if you have a central organization which is more or less above or apart from the different research agencies to whom this new agency on information is responsible you come back to the original question.

Senator Grosart: Are not we really saying that we may need a minister for science policy whose responsibility will be to see that there is a national science policy?

Dr. Solandt: Yes.

Senator Grosart: And that the operations of the departments in this area are related directly to the national policy?

Dr. Solandt: Yes.

Senator Grosart: That is really what we are saying, is it not?

Dr. Solandt: Yes.

The Chairman: Plus the usual services required by a science policy, such as information, for instance?

Dr. Solandt: Yes.

Senator Grosart: My point is that if you place this responsibility on a minister it is up to him to find out how he discharges that responsibility.

Dr. Solandt: Yes, he could operate an information agency which was widespread over the whole area of science without prejudicing his position.

Senator Grosart: He would be a sort of glorified science policy auditor general.

Dr. Solandt: This might make eminent sense.

Senator Grosart: Who would hopefully be listened to a little more than the Auditor General is.

The Chairman: We are on section 7 and I think we have to move on rather quickly. You are recommending, for instance, a major program in the field of transportation. How would you go about setting up the organization or agency, and what kind of co-ordination would there be?

Dr. Solandt: I must confess that we have been making heavy weather of getting action in this field, but we visualize that the first step is to examine very broadly, and fairly superficially, the transportation needs of Canada, which are very diverse, and then try to identify within those needs the areas in which it is most important to do research in Canada. These will be either areas that are peculiarly important to Canada or especially, areas where problems are so different from other nations that if we do not solve them ourselves they will not be solved. Then we would recommend a program to attack problems in this chosen area.

In this field, depending on which area is chosen, I would not envisage the need to set up a new department or a new mechanism. It might merely be suggested to the Department of Transport that they should concentrate effort in particular areas. For example, we have the problems of urban transportation, the problems of long distance transportation, of both goods and passengers by air, rail and pipeline; we have the problems of northern transportation. The question is to decide which of these is most important and what balance we should have between them.

The Chairman: So it was merely a kind of general proposal without any serious study of the proposal itself at this stage?

Dr. Solandt: Yes, that is right, merely saying this is an area which is of special importance to Canada but we do not yet know the specific sub-areas within this broad general problem to which we would recommend attention.

The Chairman: Yet we have within the federal Government several agencies which are involved in research on transportation problems. We have the C.N.R., the Department of

Transport, the NRC and the new transportation commission which has as one of its specific functions, research on transportation. We therefore have several agencies dealing with research and transportation. Apparently they have not done a very good job.

Senator Grosart: Is that not a large part of the problem?

Mr. Solandt: No one has yet done a study of the Canadian transportation system as a whole.

The Chairman: It is not the lack of royal commissions.

Dr. Solandt: If you look at what the royal commissions did—I was intimately associated with the last one because I was with the C.N.R. at that time. They were looking at really quite narrow specific problems. They started by accepting the existing system and saying, "How can we improve it?" I think one of our first things is to back off a little and say, what are Canada's transportation problems and if we were starting over again what kind of a system would we have. For instance, what balance should we have between road and rail and pipe lines and air lines. This is the first broad problem and within that we come to things like the grain transportation system. This clearly is not the best possible system, using modern technology. What can we do to improve it. Some studies are starting on this. Some of the western universities are working on it, such as British Columbia, and the University of Alberta in Edmonton, but it is a little like the space problem except here there is much more of it and it is going on in many places. No one has looked at it as a whole to see whether the pattern of emphasis in our research is related to our needs or not.

The Chairman: Do you know if there is any research being done, for instance, on the Hovercraft?

Dr. Solandt: I think there has been no research. There has been testing and evaluation to see whether it is applicable and useful.

The Chairman: Because if Arthur Clark is right, we may not need roads very much.

Senator Belisle: Was this not what was envisioned or proposed when the new transport commission was formed with Mr. Pickersgill as the chairman?

The Chairman: As I said before, they have a specific function to do research in the field of transportation, but it seems to me that this is just adding another research agency in that field because I do not think they are taking away any of the research responsibilities which already belong to the Department of Transport or to Public Works or the C.N.R.

Dr. Solandt: We have been in close touch with Mr. Cope who is the commissioner responsible for research and so far their interests have mainly been in economic research and costing, particularly in relationship to rail transportation, so they have not yet tackled the broad problem I am talking of and they would welcome the broad study that the Science Council proposes to undertake.

Senator Belisle: If my memory serves me right, Mr. Chairman, I recall reading the speech by the minister in the House of Commons when this was proposed. The new board of commissioners was proposed and he said a study had been made and it was the intent of the commissioners to act on the studies that had been made or implement the studies regarding transportation.

Dr. Solandt: I do not recall the speech, but he was probably referring to studies on rail transportation, the implementation of which had been delayed many years awaiting formation of the transportation commission.

The Chairman: In any case, Mr. Pickersgill will be before us on Thursday, December 19.

Senator Grosart: In regard to one of your other major recommendations, in the pollution field, particularly water pollution, do we not have the same kind of multiplicity of entities with partial responsibilities? I counted 28 different agencies, on one day, involved in water pollution, between which there appeared to be very very little co-ordination, taking the federal, provincial and municipal levels, and then the different approaches, the nuclear problem, the sewage problem, the offshore problem in regard to ships and so on. All I could bring out of a brief study of this was a great argument going on between the federal and the provincial authorities as to who had jurisdiction.

Dr. Solandt: When we started our study of water resources, as I remember, we discovered the names of, I think, 228 committees dealing with water problems. It really is one

of the most complicated and difficult areas. We are hopeful that, having backed this Central Co-ordinating Committee which I am sure has good relations with the provinces at the technical level, that they will begin to take charge, so to speak, and simplify the mechanism of elimination of a great many committees as being unnecessary.

Senator Grosart: As I read the evidence of the Deputy Minister of Energy, Mines and Resources, he did say they had very good relations at the technical level, but I got the impression that they had very poor relations at the inter-Government level.

Dr. Solandt: I really do not know the facts there. I know that this is an area in which the provinces are beginning to get together quite effectively through the Conference of Resource Ministers. And I know that the federal department, at the official level, is in very close touch with its counterparts in the provinces. I do not know about the political level.

Senator Grosart: What I am trying to get at is the description of the kind—your phrase was “the kind of system of organization and co-ordination”. “The kind of system”—what would it look like, that could do this job? You said you discovered 228 entities in this. How could they be got together?

Dr. Solandt: We have passed the responsibility for solving that headache on to the Department of Energy, Mines and Resources. I believe they are getting on quite well with it. You might be interested in getting either the Deputy Minister or the associate Deputy Minister responsible, to come and talk about it, because we have got progress reports from them from time to time and I think they are making headway in a very complicated situation.

The Chairman: They will be before us on Thursday, December 5.

Senator Grosart: I was under the impression, from reading the proceedings of the Commons committee, that they were not making progress—or, let me put it this way, that they were making progress, but the problems ahead are monumental—yet this is an area in which Canadians are very much concerned.

Dr. Solandt: Like so many scientific problems, this is a problem in political structure

rather than in scientific structure. Here we have all three levels of government involved and the tremendous complexity comes from the fact that you have not only the federal and provincial governments but many municipal governments and then many conservation authorities and others.

Dr. McTaggart-Cowan: To add to that, the International Joint Commission comes into it and agencies in the United States, because in both the field of water and that of atmospheric pollution, neither of these media are respecters of the international boundary. There was a somewhat humorous situation a few years ago in regard to co-ordination at the scientific level. Our research ships had full permission to use American harbours in dealing with the Great Lakes, and the American research ships were invited officially by Canada to use Canadian harbours when convenient. But the United States Government did not give them permission to use Canadian harbours. It took about eight months of careful negotiation with nobody disagreeing, before the research could be properly co-ordinated.

At present, I think the realization of the problem is becoming more widespread, and it is part of the philosophy of the major program to provide a focus for public attention, because if the public become concerned enough about it, then the environment to resolve these other problems is a much happier one, and this is taking place, I think, in the field of pollution.

Senator Grosart: The problem which concerns most Canadians is that the progress of pollution is out-stripping the progress of control or co-ordination, or whatever you like to call it. How do we catch up with pollution?

Dr. McTaggart-Cowan: If I could take it a step further, I think this is really behind the emphasis placed in the Science Council Report on the major program. The major program is identified to bring political, public and scientific community emphasis on an area that we feel is getting out of hand.

Senator Grosart: That was the reason I raised it.

Dr. McTaggart-Cowan: A role of the Science Council is to recommend mechanisms whereby at least the scientific aspects can be co-ordinated and brought in juxtaposition with the political and social, so that hopefully

the agencies identified can then move to get the money and the mechanism.

Senator Grosart: And here again you suggest a national advisory committee. That is what worries me.

Dr. Solandt: It is advisory to the minister and the minister has the executive authority.

Senator Grosart: But it is "to provide continuing advice, to assist in co-ordination, to review and make recommendations". Yet we had these 228 bodies all doing that. What good will another one do, if it is not a control one?

Dr. Solandt: It hopefully will control a great part of the money that is going into this. In the water report, we did specify—advise the minister on the expenditure of an identifiable budget which would be set aside for this purpose—and the agency which controls the money usually is the one which gets results.

Senator Grosart: This brings us back to the audit concept. Is this how the Americans work so effectively in some areas, where the programs come before a financial committee or subcommittee of Congress, which grants the funds? The fund granting committee of Congress in many cases seems to have the authority to control the programs or at least to give them the go ahead, or refuse it.

Dr. Solandt: This is the committee which authorizes the funds, not the appropriation committee. There are two stages.

Senator Grosart: We have nothing like that in our system.

Dr. Solandt: No.

Senator Robichaud: Dr. Solandt, on page 44 of your fourth report you deal with scientific and technological aid to developing areas. Now, while the report recognizes that Canada has its own problems of regional development, it is stated that Canada has much to offer to the less developed countries. It also states that in the field of foreign aid Canada has particular reasons for enlarging its activities and for bringing research and development to bear to improve their efficacy.

Despite the desirability and necessity for foreign aid, is it not more important for Canada to deal with the problems of regional development at home. It seems to me that there are many areas where we should direct

our efforts in trying to cure our own problems.

The reason I ask this question is that we now have under way major programs, under ARDA and FRED, to try to cure the problems that exist in underdeveloped areas in our own country. It seems to me that there is a lack of co-operation or understanding or there is a lack of practical means for curing these problems. To what is this due? Is it due to the fact that we rely too much on local recommendations? I know we have local committees organized to make recommendations, but when you look at their recommendations, even supposing they were implemented, you ask yourself just what the results would be.

To what extent is the Science Council interested in getting together different agencies in order to make recommendations that would bring in effective measures to cure the problems in those areas?

Dr. Solandt: As I understand it, you have really asked two questions. The first question is whether we should be spending money for foreign aid while we still have problems at home.

Senator Robichaud: Right.

Dr. Solandt: To my mind the answer to that is very simple. Yes, we must spend some money for foreign aid, because, as one of the very wealthiest countries in the world, if we cannot afford to help the underdeveloped countries, who can? If the underdeveloped countries are not helped, I think we are going to have world turmoil and revolution and all we do to perfect our way of life in Canada is going to be lost—not in our time, but in our children's time.

I think we must do both these things. Of this I am firmly convinced.

So far as bringing science to bear on area development problems within Canada, the Science Council has not yet looked at this problem specifically. We have not looked at it not because we think it is unimportant but because we think on the whole it is getting good, active attention. The problems of area development are among the most difficult human problems that anyone has tried to tackle. Obviously, we have not found ideal answers in Canada, but I do not think anyone else has either. I think we are doing as well as any other country in finding solutions.

Certainly, this is an area where we should spend a lot of time and effort, and it is getting good attention. I do not think the Science Council needs to call attention to it.

The Chairman: It being a quarter to one, it might be appropriate for us to adjourn. I want to thank Dr. Solandt and his colleagues for being here with us again. I am sure this is not the last time we will see you, Dr. Solandt.

Dr. Solandt: I could also say a word of thanks to you. I think the committee is doing an important and excellent job. Personally, I find the discussions here very profitable because the questions that are asked are important and relevant and cause us to think seriously about many of the problems we encounter. I regard this as a very valuable session from our point of view. Thank you very much.

The committee adjourned.



Government
Publications

First Session—Twenty-eighth Parliament

1968

THE SENATE OF CANADA

PROCEEDINGS

OF THE

SPECIAL COMMITTEE

ON

SCIENCE POLICY

The Honourable MAURICE LAMONTAGNE, P.C., *Chairman*

The Honourable DONALD CAMERON, *Vice-Chairman*

No. 12

WEDNESDAY, NOVEMBER 27th, 1968

WITNESSES:

*Organization for Economic Co-Operation and Development—(O.E.C.D.)—
Paris, France: Dr. Saburo Okita, Examiner, President of the Japan
Economic Research Centre; Pierre Piganiol, Examiner, Manager of
St. Gobain Chemical Company (France); and Dr. Alexander King,
Director for Scientific Affairs.*

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1969

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ON
SCIENCE POLICY

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The Honourable Donald Cameron, *Vice-Chairman*

The Honourable Senators:

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Belisle
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Leonard
MacKenzie

O'Leary (*Carleton*)
Phillips (*Prince*)
Robichaud
Sullivan
Thompson
Yuzyk

Patrick J. Savoie,
Clerk of the Committee.

ORDERS OF REFERENCE

Extract from the Minutes of the Proceedings of the Senate, Tuesday September 17th, 1968:

"The Honourable Senator Lamontagne, P.C., moved, seconded by the Honourable Senator Benidickson, P.C.:

That a Special Committee of the Senate be appointed to consider and report on the science policy of the Federal Government with the object of appraising its priorities, its budget and its efficiency in the light of the experience of other industrialized countries and of the requirements of the new scientific age and, without restricting the generality of the foregoing, to inquire into and report upon the following:

(a) recent trends in research and development expenditures in Canada as compared with those in other industrialized countries;

(b) research and development activities carried out by the Federal Government in the fields of physical, life and human sciences;

(c) federal assistance to research and development activities carried out by individuals, universities, industry and other groups in the three scientific fields mentioned above; and

(d) the broad principles, the long-term financial requirements and the structural organization of a dynamic and efficient science policy for Canada.

That the Committee have power to engage the services of such counsel, staff and technical advisers as may be necessary for the purpose of the inquiry;

That the Committee have power to send for persons, papers and records, to examine witnesses, to report from time to time, to print such papers and evidence from day to day as may be ordered by the Committee, to sit during sittings and adjournments of the Senate, and to adjourn from place to place;

That the papers and evidence received and taken on the subject in the preceding session be referred to the Committee; and

That the Committee be composed of the Honourable Senators Aird, Argue, Bélisle, Bourget, Cameron, Desruisseaux, Grosart, Hays, Kinnear, Lamontagne, Lang, Leonard, MacKenzie, O'Leary (*Carleton*), Phillips (*Prince*), Sullivan, Thompson and Yuzyk.

After debate, and—

The question being put on the motion, it was—
Resolved in the affirmative."

Extract from the Minutes of the Proceedings of the Senate, Thursday, September 19th, 1968:

“With leave of the Senate,

The Honourable Senator Lamontagne, P.C., moved, seconded by the Honourable Senator Benidickson, P.C.:

That the name of the Honourable Senator Robichaud be substituted for that of the Honourable Senator Argue on the list of Senators serving on the Special Committee on Science Policy.

The question being put on the motion, it was—
Resolved in the affirmative.”

ROBERT FORTIER,
Clerk of the Senate.

MINUTES OF PROCEEDINGS

WEDNESDAY, November 27th, 1968.

Pursuant to adjournment and notice the Special Committee on Science Policy met this day at 10.00 a.m.

Present: The Honourable Senators Lamontagne (*Chairman*), Grosart, Kinnear, Robichaud, Thompson and Yuzyk. (6)

Present but not of the Committee: The Honourable Senators Connolly (*Ottawa West*), Giguère and McGrand. (3)

In attendance:

Philip Pocock, Director of Research (Physical Science).

Mr. Gerard Bell, O.E.C.D. Secretariat.

The following witnesses were heard:

ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT—
(O.E.C.D.)—PARIS, FRANCE

Dr. Saburo Okita, Examiner, President of the Japan Economic Research Centre;

Pierre Piganiol, Examiner, Manager of the St. Gobain Chemical Company (France); and

Dr. Alexander King, Director for Scientific Affairs.

(A curriculum vitae of each witness follows these Minutes.)

At 12.25 the Committee adjourned to the call of the Chairman.

ATTEST:

Patrick J. Savoie,
Clerk of the Committee.

CURRICULUM VITAE

Okita, Saburo, Dr. Age: 54 Education:—B.A.—Tokyo University, Engineering Faculty (Electrical) Ph.D. (Economics)—Nagoya University Occupations: Since 1964—President of the Japan Economic Research Centre 1962-63—Director, Overall Development Bureau—Economic Planning Agency 1954-62—Director, Overall Planning Bureau and other assignment with Economic Planning Agency 1952-53—Chief, Economic Studies Section—U.N., Economic Commission for Asia and the Far East Publications:—Causes and Problems of Rapid Growth in Postwar Japan and Their Implications for Newly Developing Economies (English)—Japan and the Developing Nations (English)—Japan's Economy in Future (Japanese) and others, about a dozen books in Japanese.

Piganiol, Pierre Age: 53 Education:—Ecole Normale Supérieure Diplomas:—Agrége in Physical Sciences Occupations:—1947-56; Manager of the St. Gobain Chemical Co. 1956-58; Conseiller Scientifique de la Direction Générale 1958-61; Délégué Général à la Recherche Scientifique et Technique 1962; returned to previous position with St. Gobain Chemical Co. Other Positions:—Membre du Conseil d'Administration de l'ORTF—Président du Conseil d'Administration de l'Institut National de la Recherche Agronomique—Membre de l'Académie d'Agriculture de France—Chairman of OECD Committee formulating working paper for First Ministerial Meeting—Rapporteur Général de la Conférence sur les rapports des scientifiques et des parlementaires (OECD and Council of Europe, 1964)—President of Chemical Engineering Section of the Society of the Chemical Industry. Publications:—Many articles on chemical kinetics—'Towards a Science Policy' a book written with M. Louis Villecourt—Examiner for 'Reviews of National Science Policy: Belgium and Japan'. Languages:—French, German, English, Russian.

King, Alexander, Dr. (C.B.E.)—Age: 59. Studied chemistry at the Imperial College of Science, London, and the University of Munich. Demonstrator and later Senior Lecturer, Imperial College, (until 1941). Harrison Prize, Chemical Society (1939). 1939 Leader, Imperial College Expedition to Jan Mayen. 1941-1942 Deputy Scientific Adviser, Minister of Production. 1943-1947 Head of the United Kingdom Scientific Mission, Washington, and Scientific Attaché, British Embassy, Washington. 1947-1950 Head of the Scientific Secretariat, Lord President of the Council, London and Secretary, Advisory Council on Scientific Policy. 1948-1951 Honorary Secretary, Chemical Society of London. 1950-1957 Chief Scientist in charge of Intelligence and Overseas Divisions, Department of Scientific and Industrial Research, London. 1951-1957 Chairman, Productivity and Applied Research Committee of the Organization for European Co-operation. 1954-1962 President of the International Federation of Documentation, The Hague. 1957-1961 Deputy Director of the European Productivity Agency of the Organization for European Economic Co-operation. 1958-1961 Director, O.E.E.C. Office of Scientific and Technical Personnel. 1961 Director for Scientific Affairs, O.E.C.D.

THE SENATE

SPECIAL COMMITTEE ON SCIENCE POLICY

EVIDENCE

Ottawa, Wednesday, November 27, 1968

The Special Committee on Science Policy resumed this day at 10.00 a.m.

Senator Maurice Lamontagne (*Chairman*) in the Chair.

The Chairman: Honourable senators, as you know, OECD is now making a study of Canada's scientific effort and science policy, and we are fortunate this morning to be able to receive two Examiners who will have a lot to say, I presume, in delivering the report on our country.

The biographies of these two gentlemen have already been circulated. I would only like to say at this stage that Dr. Okita from Japan is one of the Examiners, and he is also President of the Japan Economic Research Centre.

[*Translation*]

I should like to introduce to the members of the Committee Mr. Piganiol, seated to my left, who has now returned to private industry, to his old loves, at Saint-Gobain, but who has been involved all his life in science policy and scientific endeavours. A few years ago, he was a general delegate to the *Recherche scientifique et technique* (Scientific and Technical Research) in France. I believe he also collaborated actively with OECD and Dr. King. He was even one of the Examiners when OECD made a study on science policy in Japan. In other words, we may possibly hear France's views on the situation in Japan.

[*Text*]

Senator Grosart: Well said.

The Chairman: I wish also to welcome Dr. King, who has previously appeared before the Committee. He is one of two men who appeared before our Committee when it was equally "dead" as a result of dissolution last spring.

I would also like to indicate that Mr. Gerard Bell of the Secretariat of OECD is also with us.

Without further comment, I would like first to invite Dr. Okita to make an opening statement. Then I will ask Mr. Piganiol to follow; then we will have the usual discussion period.

Dr. Saburo Okita (*President, Japan Economic Research Center, Examiner, Organization for Economic Co-operation and Development*): Mr. Chairman, this is a very honoured occasion for me to speak before this distinguished gathering.

Mr. Chairman, you have introduced us as Examiners on this OECD mission here. My capacity and background as a member of this team is as an economist rather than a scientist, but actually I have some engineering science background and training with the engineering faculty during my period at university. I was also in charge of economic planning of the Japanese Government for several years, and in that capacity, and even since that time, I have been involved in various aspects of the science policy of the Japanese Government.

As a matter of fact, my colleague Mr. Piganiol was one of the OECD Examiners of Japan's science policy some two years ago, the report of which is produced here; and I was saying to him that he could have spoken on my behalf without my presentation.

However, I feel I should give you the somewhat more recent developments in our science policy, which might be of some interest to you.

One of the things I have particularly noticed after visiting various institutions in Canada is the difference between the science policy of Canada and of Japan. In one of its aspects, it is my feeling that in Japan we emphasize very much the research undertaken by industries, and we feel that we are

somewhat neglecting basic, fundamental research in universities and in government laboratories. The OECD report on Japan has already indicated that aspect. In contrast to the general character of our science and research activities, here in Canada we feel that your emphasis is more on basic, fundamental research, and that a very large part of such basic research is undertaken by government laboratories. Furthermore, you have excellent measures to foster and encourage research activities in universities. We are very much impressed by the very rapid progress and expansion in the research activities in universities.

In a sense, Japan is more oriented towards the application side of science and technology; partly because we are one of the late-comers in the world economy, importing foreign know-how and techniques into our country so as to modify and adjust to local conditions and to try to produce goods to be exported to foreign markets.

This has been one of the basic characteristics of our science and research policy, and so far, economically, this has been a rather effective measure; because, without having rather heavy expenditures on basic research, we have made use of the results of research being undertaken in other advanced countries.

Recently, however, as per capita income has been going up and as wage levels have been getting higher and higher, we realized the importance of depending more and more on engineering research activities. Unless you have a high level of scientific engineering research, you will not get the importation of foreign technology on equal terms. We shall depend more and more on the exchange of science and technology on an equal footing; and for that purpose we feel it is very necessary to encourage research activities not only in the application field but also in basic, fundamental research.

We have rather detailed statistics on the import and export of technology. Last year, 1967, for the fiscal period which runs from April to March, according to recent statistics announced by the Government, we had some U.S. \$240 million of payments for imports of technology, and some U.S. \$27 million of exports of technology. This ratio between payment for importing foreign technology and foreign exchange earned by exporting Japanese technology, was rising year after year.

Some ten years ago the ratio was about 100 to one, and we depended very heavily on imported technology; but last year the figure was 10.9 per cent, or around 11 per cent, so that of the payment for the import of technology we earned about 11 per cent by exporting Japanese technology to foreign countries.

As to total expenditures compared with G.N.P., last year research expenditure was 1.3 per cent, and about 1.6 per cent of national income. Our target is to run about 2.5 per cent of national income for the total expenditure on research, although the date has not been given, partly because the Minister of Finance does not accept the definite figure and date because they feel this binds their budget preparation too much.

Last year if we add the cost of importing foreign technology, the percentage will rise to 1.46 per cent of GNP. The domestic expenditure for research is 1.3 per cent of GNP, but in addition there is the payment for foreign technology, and if we combine both this will be about 1.46 per cent of the GNP.

Recently we have been discussing very much the planning of science and technological research. We have been having these economic plans for the past ten or fifteen years. I myself have been very much involved in the process and the preparation of economic plans for our Government in connection with the necessity and importance of setting up scientific and engineering research activities.

Also, partly because of the expanding size of research activities in the so-called "big" sciences, the expenditure of the Government for encouraging and expanding such research activities must be looked at from a somewhat longer range point of view, and must be looked at from the point of view of national needs. There must also be some balance between those expenditures and other items of Government spending.

There is a new Bill being prepared by the Government to be submitted to the next Diet session that is fundamental law for science and technology advancement. This Bill was presented to the Diet during the last session but was not then approved, and it was carried over to the next session. The Government expects that in the next session this fundamental law will be approved by the

Diet. In preparation for that, the Science and Technology Agency set up an advisory committee to discuss the nature of the science plans to be produced in accordance with the proposed new legislation.

I was one of the members of this advisory committee. We discussed in some detail the nature of science planning in Japan. Broadly speaking, there are three major fields of science and technology activities. One is the direct, government field, the research done by the government institutions. The second field is the research being undertaken by universities. The third is research undertaken by industries.

We feel that in this government sector of research we need somewhat more detailed planning, because this field is directly related to government activities and sometimes this field involves so much of the "big" sciences.

Secondly, for universities there are rather delicate issues in Japan, partly because we have a long-established, separate Ministry of Education which deals with university affairs, including research activities undertaken by university laboratories.

The Science and Technology Agency is a relatively new institution which was established some ten years ago. The Ministry of Education insists that the research activities planned in universities should be outside of the Science and Technology Agency. This is the sort of inter-ministerial problem which every government may face.

Another related problem is the distinction between the natural sciences and social sciences. Social scientists are very sensitive about any type of planning which is done by government; so, for the time being, in this new legislation, the social science aspect is excluded from the scope of planning. This is mainly for political reasons. Social scientists are very much afraid of direct government intervention in any form. On the other hand, we feel that the borderline between the social sciences and natural sciences is getting more and more obscure, and that we may need some measures to bridge those two fields.

Recently we had a case of the relationship in connection with the U.S.-Japan Science Council. There was a proposal from the U.S. Committee to take up input-output table study jointly between Japan and United States. There was also another proposal, to

include in that joint science committee the problem of urban development.

Those two items were the concern of a Japanese committee outside of the science committee, because they belonged to the social science field; but after some lengthy discussions stretching over three years, we decided to include this boundary field of input-output analysis and urban development issues which have a close relationship with natural science programs. There are many more aspects we should discuss.

Just one additional point. We have a Science Council, and this Japan Science Council is an elected body. There is another science policy deliberation advisory council attached to the Minister of Education. There is another advisory council attached to the Science and Technology Agency. These three councils have somewhat different functions; partly because of this distinction between the humanities or social sciences and the natural sciences; also the distinction between university research and research outside of universities. Some of this background is given in this OECD report, so I shall not dwell on this point.

This much, Mr. Chairman, I should like to present to your Committee.

The Chairman: Thank you very much, Dr. Okita. Maintenant, Mr. Piganiol.

[Translation]

Mr. Pierre Piganiol, scientific adviser to the Compagnie de Saint-Gobain; formerly délégué général to the Recherche scientifique et technique (Scientific and Technical Research) in France; Examiner for Organization for Economic Co-operation and Development: Mr. Chairman, honourable senators, I shall probably not do justice to the honour you have given me in inviting me here, for the issues in France are no longer fresh in my mind.

Senator Lamontagne: They change quickly.

Mr. Piganiol: They change quickly, and besides, when I visit a country for OECD, I tend to forget about my usual environment and try to live in that new country as if it were my own. The kindness, co-operativeness and dependability of all we have met have certainly made me feel at home in Canada. I am feeling rather like an adopted Canadian

for these few days, and it may be a little difficult to become a French government official again for a few minutes.

I shall try to be brief and shall simply draw your attention to a few difficulties which you may have come across in Canada: the problem of the universities, the problem of government, and two special problems: agricultural planning and industrial development.

First, the university problem. In 1958, there was very little national research activity carried out; it absorbed a total of only 0.6 of the gross national product. It was absolutely necessary for the government to step in, but we knew that this idea would be ill received in intellectual circles. The only reasonable solution was to quickly provide the necessary funds so that the universities could conduct their own research quite freely, with sufficient means. This is what we did, and in three years we have increased tenfold the amounts of grants offered to the universities without conditions of any kind.

At the same time there was an agency in France which had existed, for historical reasons, since about 1936; it had a number of names but was finally called the *Centre national de recherche scientifique* (National Scientific Research Centre). The purpose of this agency was twofold: first, to help the universities by means of supplementary grants (the CNRS distributes grants to universities); it is a supplementary but selective operation; secondly, to direct those of its own laboratories which are involved in important scientific problems. It appeared that the CNRS could be the basic tool of a consistent science policy in the area of basic science, which I might call the policy of the scientists themselves. Indeed, though they are not always aware of the fact, scientists obey certain fundamental laws—the laws of the pursuit of knowledge. They are not sure what these laws are. We must help scientists to formulate them, demand that they formulate them, demand that they clarify in their minds what may result in a considerable improvement in the methods of carrying out disinterested intellectual endeavours.

The CNRS was authorized by law to publish a regular report on the scientific situation, an analysis of programs they felt it advisable to adopt, and hopefully, an analysis of inter-action between the results obtained in

the various fields. This part of CNRS' work is carried out by a fairly large number of commissions—thirty-two—which deal with the pure sciences and the social sciences. Moreover, we were pleased to see that the CNRS, acting on its own initiative, set up a wide variety of agencies, complementing one another; developed the concept of co-operative research in programs being carried out by several scientists or several laboratories; and developed the concept of a team, or associated laboratories, in the universities.

In short, generally speaking, we may say that this system corresponds to a very reasonable, very worthwhile program of basic science development. However, the CNRS has run into an administration problem. These commissions are set up in a very particular way. Half the members are elected by the scientists themselves, one quarter are appointed by the National Education Minister, which to some extent makes up a possible deficiency in this election system, by seeing that eminent university figures are not left out, and the last quarter are appointed by the Prime Minister, who draws them from other ministries—the Ministries of Armies, Industry and Agriculture—with the result that each commission is to some degree exposed to the outside world. Generally speaking, this system works well, but I am prepared to analyze with you a little later on the few defects which obviously must exist in any system.

Let us now leave the matter of universities and go on to the government. It was necessary to co-ordinate, and probably, especially at the beginning, to plead the cause of scientific research to the government and the Minister of Finance. Indeed, if there is no co-ordinating agency, the government and the Minister of Finance may have the impression that money is being spent through a great number of channels, for a wide variety of causes, but that there is no general, unifying policy. This is a quite legitimate complaint on the part of the government, but it need not always be as well-founded as one might think. In fact, a country's scientific efforts are always guided by much sounder principles than is generally believed.

Therefore, one of the tasks of a government agency in charge of scientific research and development is to take an inventory, to present it in a systematic, coherent, organized fashion, to show the results of such-and-such a project, and the consequences of such-and-

such a failure. This was the task of the general delegation to scientific and technical research which I believe was therefore better able to plead the cause of scientific research in the country to the various ministries. This delegation immediately encountered difficulties. Except in the case of the Ministry of National Education, the ministries have urgent problems to solve. Scientific research is always somewhat hampered by the fact that the Ministry of Agriculture, for example, must maintain a consistent agricultural policy, which places the *Institut national de la recherche agronomique* (National Farm Research Institute) at a disadvantage, and so on. Therefore, the so-called "envelope" procedure was adopted, according to which all research budgets of all ministries are grouped together, discussed together, adjusted, geared to the highest government level, then redistributed among the various ministries, which are still responsible for carrying out the projects. This general delegation to scientific research must therefore be situated at the highest level of government. Its representative to the Prime Minister is in the person of a federal minister in charge of scientific and technical research and atomic and space affairs; it serves as a secretariat to an interministerial committee which groups together all ministries involved with science. It is assisted by a council made up of twelve eminent scientists, chosen from a wide variety of fields, including industry. These twelve scientists sit with the ministers, and are entitled to speak and vote at meetings of the interministerial committee.

Here, then, is the general plan: a scientific authority working closely with the Prime Minister, a strong secretariat and the delegation preparing reports, cases and budgets, and proposing various measures to the government. We shall now briefly discuss one of these proposed measures, that of co-ordination.

A moment ago I spoke in support of a country's spontaneous science policy. I should now emphasize that this spontaneous policy may nevertheless be incomplete. Thus, France has not dealt with genetics for forty years. Within two fields, physics and chemistry, there are certain areas left untouched; physical chemistry was not developed in France until after the last war. In short, there must be a control agency which may intervene quite directly in emergency situations, if need be. The co-ordination process consists in choosing topics of national interest and set-

ting up a plan for studying them, a plan which binds various university, government or industrial laboratories by contract to collaborate. These co-ordinated projects must not take over five years. At the end of five years, either the problem is solved or it becomes a permanent problem of the modern world, permanent in the sense that it will take at least 15 to 20 years to solve. In this case it must become the responsibility either of a country's regular scientific research agencies or of new agencies which must be set up for the purpose. I shall give you two examples. In France, medicine, chemistry, physics and biology were at one time only loosely related. In order to study an important field of modern science, molecular biology, it was necessary to have scientists in these various fields collaborate. A large-scale co-operative effort was undertaken, but has now been abandoned, for it now seems that this co-operation among doctors, chemists, physicists and biologists has been largely achieved.

Another important area is oceanography. A committee was set up to promote co-operation among all the laboratories in France which dealt with oceanography. After five years it seems that the project is well underway, but it is not enough to gain for France an honourable position in the field of oceanography. This is a permanent problem for a country bordering on the ocean, and the co-operative committee is being converted into a government agency, the *Centre national de l'exploitation des océans* (National Ocean Development Centre), which is now in existence and which sets up its own programs. A similar effort has also been carried out in the field of space research.

Very briefly, these are two particular cases which may draw our attention to problems with which Canada is also involved. The other cases I mentioned were relevant to Canada as well. I should just like to draw your attention to one fact: I am not certain whether these solutions will be accepted unconditionally by a federal government, especially a government which seems to be on extremely good terms with the universities, that is, which seems to have a highly developed natural tendency toward co-operation with them. But surely some solution can be found for Canada.

The first example I shall give is agriculture. Certainly, if we did not have this system of delegating certain powers in the field of

research, then research in agriculture within the ministry itself would serve only to resolve short-term problems rather than foresee and resolve in advance agricultural problems. There is a very important idea here. If the economy is planned, or simply if agriculture is directed, let us say, by a ministry, what we would have is a relatively short-term policy. The policy would take into account established scientific results but could not, for very good reason, take into account the possible results we might hope to obtain in science.

In other words, an agricultural and industrial plan will cover a given period of time, let us say the next 5 years; however, the scientific work which will be done during these 5 years will influence the next plan or even the one after that. There is therefore a time gap which makes it necessary for us to set up different bodies for scientific planning and for economic planning or, if you feel the word "planning" is too strong, simply for economic orientation and choice and scientific orientation and choice. In this regard, the fact that we have been able to provide some leeway in our farm research methods when we are dealing with immediate problems has enabled us to view problems such as the balance between milk and meat, grain and feeds, animals, and so on, from a much broader and longer-range point of view.

As regards industry, the situation is much the same. However, in a liberal economy which nevertheless does include nationalized industries, it is difficult to bring action to bear on industry. Now our industries, in certain cases, have shown a reluctance towards innovation. On the other hand, we must recognize the fact in the modern world there are a number of conditions which are hardly favourable to industrial development. I am thinking of the position of France which in volume, in size, in national income is a relatively small country and where, consequently, the manufacturer about to launch into new fields would run serious risks as the market for certain peak technologies is a very difficult one. A system must therefore be found whereby industry could run considerable but not excessive risks. I think we might safely say that an industry launching into a new field in the United States incurs much fewer risks than an industry embarking on some innovation in Europe. It might even be said that there is a market in the United States for

any gadget that might be invented. The market may disappear at the end of a year when the worth of the gadget has been tested, but at least some new venture was possible.

America is very receptive. France with its national income level is not very receptive. In certain cases, the risks assumed by manufacturers are very heavy. The government therefore intervenes in cases where the stakes are high either through subsidies, conditions which are not favoured greatly but which are nevertheless practised in certain cases, or through loans to be paid back only if success is assured. This is apparently a workable formula which at the present time provides a certain impetus to operations such as the turboprop, certainly an important means of transportation for the future.

Senator Lamontagne: Are these loans completely repayable?

Mr. Piganiol: Generally part of the loan is given in the form of a subsidy but only a very small part. In a specific example I know of, a free-piston motor, the non repayable portion of the loan was very small, approximately \$40,000; the refundable portion, in the event of success, was 4 to 5 times greater. I know of cases in which a part of the loan is refundable only in the event of success. The deciding factor here has much to do with national interest and the nature of the risks.

This leads us to a final point. In the great technological, space and military adventure we are involved in today—tomorrow it will probably be oceanographic—innovation is a primary tool. A great technological adventure in a country of 50 million inhabitants is often on first thought, a difficult matter to consider.

Very recently, however, we have come to realize that it is not simply the great technological adventure involving big science which is impelling industry onward but other, simpler problems, perhaps more difficult to resolve, such as pollution of our air and town planning, both of which offer important challenges to industry. But you see that here again, as in the great technologies, we are dealing with a collective market. We are witnessing, basically, a separation—and I feel the same situation exists in Canada as indeed, in all modern countries—a separation between the consumer market where a certain object goes to one individual and the overall market for a society: its defence, i

great technological adventure, its town planning perhaps, its recreation. This dissociation of the two markets is probably one of the notable changes of our times.

I have spoken too long and I apologize. The impression I should like to leave with you, perhaps, is that the system is not perfect; no system is perfect in scientific research. I feel, however, that it has had two chief merits: first of all, contrary to the initial hopes of the government which felt that the creation of a research delegation would simplify all mechanisms of financing, contrary to this hope, I repeat, what has resulted is a co-ordinated multiplication of financing sources and a much greater flexibility. I do not feel that in matters of scientific research there is any policy which can be reduced to a simple formula and which we can summarize in a few words or which can be provided for in a single budgetary plan. The reality we are dealing with is much more complex and I feel that to a certain extent this initiative on the part of the French government has taken this reality much more adequately into account.

The second point is that the country has become aware of the reality of its research and its requirements. Research has become a factor in national policy. In this respect the attitudes of young people in industry have been drastically changed. Manufacturers who serve on the committees of the CNRS, and who sit with 12 scientists on the interministerial committee, acquire a vision of things which definitely has an impact on their industries. At the same time they gain a better insight into international problems, enabling them, I feel, to better tailor their efforts to the vision of a modern world.

There is one final point I have to make. You are aware that we, like you, and more so, have trouble with our young people. It is important to recognize this fact, for if we failed to do so we would be glossing over a major blot in the picture—and blots are often instructive.

French young people do not have the fine universities I have seen here, and when visiting Simon Fraser University in British Columbia I could not help but think I was probably in the most beautiful of all universities. The location, the buildings and campus, the number of professors, their educational background, their ready and spontaneous co-operation, the association of the students in a

permanent dialogue—in short, everything seemed to be arranged so that there would be no problem. And yet the university had just called in the police to clear its administrative offices.

We are persuaded, therefore, that there is a much more serious problem which, I feel, can be explained in the following terms. First of all, our young people—I am not speaking here of the political agitators, the nihilists who stage demonstrations; there is whole temporary crowd of misfits, a minority in revolt against the family and society whom we shall not consider here—the nice, well-adjusted young adults allow themselves to be too easily swept away.

I feel that science is somewhat responsible for this. Science has created a very complex world and yet it is not certain whether we have equipped our young people to deal with this world. We have given them useful, intellectual tools, but these are not sufficient.

To equip a man for his world, a certain form of culture is necessary, a culture which formerly in France was primary education and which meant that at twelve years of age a child was basically a good, average citizen; he was, in any event, capable of becoming so.

I have the impression that today there is a complete lack of basic training, of an explanation and philosophy of the world which means that young people quite naturally fall into the delusion that life should be a beautiful carpet spread out before them.

There is certainly much to do and it seemed to me that the beautiful Simon Fraser University in Burnaby just lacked this relationship between the humanities and the exact sciences. We were told that it was one of the universities in which there was practically no "non-selective science," no non-scientific option for science students, a phenomenon we discovered in many Canadian universities. Conversely, a course in the humanities includes no scientific option, no introduction to logic or administration.

I feel that there is a basic problem here which gives us one more reason not to separate the humanities and natural science in a science policy, a science policy which, in the final analysis, strengthens that of culture and education and goes hand in hand with economic policy. This is certainly a most difficult balance to achieve.

I must say that Canada, by her powers of reason, the quality of her people, this willing, natural co-operation among you, seems to me to be a country particularly blessed for finding valid solutions to the problems of the changing world. The repercussions from the changes wrought by science will not be felt until some 20 or 30 years hence because our society has not yet adapted.

Mr. Chairman, these are the comments I wished to make on a number of essential points. There is so much to say! Naturally, I shall be pleased to answer any of your questions.

The Chairman: Thank you very much.

(Short recess)

[Text]

UPON RESUMING:

The Chairman: Senator Grosart.

Senator Grosart: Thank you, Mr. Chairman. I think I should add to the words of welcome that you gave to our distinguished guests by saying that it is a rare opportunity for us to examine the examiners.

We are all aware of the great importance that is attached internationally to these examinations of the science policy and science performance of various countries.

With your permission, Mr. Chairman, although I know some of us have a sketchy knowledge of the purpose and scope of these examinations, I would like to ask Dr. King if he would just fill in the background of these OECD examinations, giving us the countries that are examined, the components that go into the examination, and the broad criteria that are used in reaching assessments and judgments.

The reason I particularly ask that is that our job as Science Policy Committee is really to see what the components should be and what the criteria should be; and with your experience in the international field I think you might give us some very, very useful guide lines in this respect.

Dr. Alexander King (Director for Scientific Affairs, Organization for Economic Co-operation and Development): Mr. Chairman, the OECD examination of science policy—and, indeed, of educational policy, which is a parallel series to which Canada has not yet been subjected, is derived from a system which

was started at the end of the Marshall Plan period by the OEEC in Paris for the examination of national economic policies. In fact the economic policy of each member country is examined by OEEC every year.

This, of course, is mainly on the basis of statistics which give trends, which raise warning signals of inflation, of balance of payments difficulties, general conjunctural questions and so on. This has been done for every country every year and, I think, has been a strong influence towards harmonization of the policies of most European countries, and since OECD was created, of the North American countries and Japan also.

This technique, which is a new technique of international co-operation since the War, a kind of mutual consultancy, has the objective of helping countries by examination by objective observers from outside the country on the basis of statistical and other information of the country; it can be accepted, rejected, assimilated or by-passed by the recipient country.

Examinations are also undertaken in a series of other policies. For example, the aid policy of countries is examined rather frequently; the agricultural policies, science policies and educational policies.

The general reason for this is twofold. Firstly, this examination of science policy gives the totality of OECD countries an intimate experience and knowledge of the structures, traditions, achievements, experiments and policies of all the member countries. In subjects such as science policy which are developing rapidly in all countries, each can profit by the experience of other countries at a very early stage.

In science policies, we can, with the resources of OECD, only undertake the study of about three countries per year. The method, as you know, is to send one or more rapporteurs at an early stage to prepare a basic documents giving the statistical and descriptive aspect of science in the country. The Canadian basic report on this has already been done. It is available in a few copies in French; it is due in English any moment. This is a compilation of data and descriptive material on the Canadian science scene, which I am sure will be useful to your own Committee as well as more generally within OECD.

The examiners then visit the country, and we three here are the people in question on this occasion. The examiners are chosen as the result of negotiation between the country under examination and OECD. For example, some countries are anxious that the examiners should not be from very big countries where problems of scale may have oriented their attitudes and so on. The question of language comes in also.

The time of the examination is likewise negotiated between OECD and the countries. At the moment there is a queue of countries waiting to be examined, and most countries have asked for examinations to coincide with internal discussions on science policy. As far as Canada is concerned, this fits in very well with your own deliberations, with the McDonald Committee's Report and so on.

Senator Connolly: Can I just ask, Dr. King, if Senator Grosart will not mind, who did you consult with in Canada as to this inquiry?

Dr. King: Well, this arose from discussions essentially with the Science Secretariat.

Senator Connolly: Good.

Dr. King: Then the next stage of the examination is that the examiners write a report under their personal signature. So that this is not an official report which commits OECD to a collective opinion on the scene of the country concerned, which would be absurd.

The next stage is the confrontation in Paris, when a senior group from the country under examination comes to Paris and is cross-questioned for a day or more by the examiners in the presence of senior policy people of the other member countries.

This is usually rather a frank discussion, a privileged discussion, with no members of the press or public present. At times they can be very frank.

Then there is a published report which, of course, again to some extent has to be negotiated, because of general political considerations, but which contains the background report, the examiners' report. This is not changed, it is more or less kept as it is, because it is the responsibility of individuals and not of an organization, and a general account of the discussion. This is made available for discussion within the country.

The criteria essentially, unless specially negotiated with the country, are those of the general development of science policy, the relation between national goals, scientific effort; relation between government, industry, universities; general planning of science and other topics of a qualitative nature within this general scheme.

As this matter evolves—and this has also been true of our educational reviews—a country may ask for emphasis to be placed on a certain subject.

For example, we are doing at the moment in the educational review series, the review of the United States; but the U.S. has asked us to concentrate on problems of educational research and innovation: in other words, the trends in the educational system and the new possibilities opening up for the future towards giving education a greater relevance.

In the case of the Japan review, it was suggested by our own countries that they would like the review to concentrate on the transition in Japan from a policy of, if you like, imitation to one of innovation, and the place of education and science in this transformation.

In the case of the United States review, which was done last year and which has been rather influential, the concentration of effort was American-European comparisons in some way related to the technological gap, but in the perspective of the total deployment of U.S. science and its policy and lack-of-policy aspects.

In the case of certain countries where the review takes place at a period of change or impending change the result is rather influential; very often, and I think most frequently, in increasing the depth and perhaps the sophistication of dialogue within the country, suggesting various approaches which are then assimilated by the country in terms of its own structures and traditions, rather than merely by imitating something from abroad.

To sum up: the reviews are partly for the general information of the country and of all the OECD countries. Partly they represent a kind of management consultancy approach, hoping that by the looking objectively at a situation by people with no possible vested interest some ingredients of policy change may be suggested to the country for assimilation in terms of its own needs and its own structures.

Senator Grosart: Thank you very much. May we take it then that the criteria are both absolute and comparative?

Dr. King: Yes, sir. We have looked very little at the comparative aspect so far, but Mr. Bell, who is in charge of this work, is most anxious that the total experience that we are accumulating from many countries now, be in fact projected in a comparative sense.

Senator Grosart: Thank you very much.

Dr. Okita, perhaps I may repeat a story that I told you last week, because it bears so much on the comment that Dr. King has made on the transition in science and technology in Japan from what he called the imitative to the innovative.

About a year ago there was a Japanese trade mission in New York, and the head of the mission was interviewed by the financial press, and one question he was asked was: "What is your major problem in the export markets to-day?" And the reply was, "Cheap American imitations".

It is very interesting, Dr. Okita, that you have told us that in Japan the percentage of R. & D.—and I take it that that is public money, the figure you gave us, 1.3 per cent?

Dr. Okita: No, including the private industries.

Senator Grosart: This is the total investment in R. & D. in Japan?

Dr. Okita: That is right; about 70 per cent of which is spent by private enterprise, and about 30 per cent government sources.

The Chairman: When you say "spent," you mean financed by industry?

Dr. Okita: Yes.

Senator Grosart: So that only about 30 per cent is funded by the government in Japan, 30 per cent of 1.3 per cent. How does that compare with what you have found in Canada?

Dr. Okita: Government-funded research expenditure is about Canadian \$400 million.

Senator Grosart: Yes.

Dr. Okita: And you have a Gross National Product of about 70 billion; that is 0.6 per cent of Gross National Product.

Senator Connolly: And in comparison with investment from the private sector in Canada?

Dr. Okita: I have not got this private figure.

Dr. King: It is in the report.

Dr. Okita: It is in the report somewhere.

The Chairman: What was the question again?

Senator Connolly: Senator Grosart asked Dr. Okita how much the contribution from the public sector was for research in Canada, and he said \$400 million. I asked whether or not the group inquired about the extent of the contribution to research from the private sector.

Senator Grosart: I think the answer is that it is the difference. In other words, it is just about the same, because 1.3 brings us up to 700 or 800 million, and if the government share is 400 million it must be about fifty-fifty.

The Chairman: I do not think so. I think that the government share is closer to two-thirds in Canada.

Senator Robichaud: It is the reverse of what it is in Japan.

Senator Connolly: I realize that, but what I am getting at, because I think Senator Grosart's first question was a great question to ask, and it is so important that we should have such distinguished gentlemen here from OECD doing this work: I wondered what they found about the participation by the private sector in the work of research. I hope you will excuse me for intervening.

Senator Grosart: Yes.

Dr. Okita: Mr. Chairman, I do not remember the figure off hand, but my impression was it was just the reverse of Japan here. This \$400 million figure is just the direct federal expenditure, and there will have been provincial expenditures and other public sources. I would have to check the figure with our basic document. Mr. Bell has got the figures.

Dr. King: Perhaps Mr. Bell has it here.

Senator Connolly: Do you mind, Senator Grosart?

Senator Grosart: No.

Senator Connolly: When you estimate the amount that is contributed from the public source in Canada, you are considering only the federal contribution and not the research that is sponsored by provincial governments?

The Chairman: There is very little in Canada.

Senator Grosart: I wonder if we may follow that up and ask if Mr. Bell happens to have the figure.

Dr. King: He is looking it up at the moment.

Senator Grosart: Perhaps he might intervene later. The reason I ask this is that there are great divergencies in the figures that we have had. The Dominion Bureau of Statistics figures show a variance from the evidence we have had here—and I am not criticising DBS. DBS does not make an outgoing scientific survey of these figures; it depends on responses; out there is this divergence, and I think everybody in this Committee feels it is most important that we get an accurate picture.

May I now go on to a very interesting point, Dr. Okita, which you raised in connection with including the cost of imported technology in these general figures. This, I think, is particularly interesting to Canada.

The figure you gave was, I think, that it was about 0.1 per cent of your GNP. You said, I think, that if you added the payments on imported technology, it would raise the .3 per cent to 1.4 per cent.

Dr. Okita: 1.46 per cent.

Senator Grosart: 1.46. I presume that the Canadian figure would be very, very different.

To what extent have you examined the impact of imported technology in Canada, particularly through subsidiaries of American firms where we have a situation that is perhaps unique in the world?

Dr. Okita: We have not come across any definite estimate. Here the condition is rather different from Japan, because in many companies here the line of demarcation between Canadian and foreign is not very clear. In Japan we have a rather distinct borderline, so we can compile statistics of this nature; but here as far as we know such similar estimates may not be feasible. Some members may enlighten us, but as far as I myself have studied I have not a definite figure.

Senator Grosart: Obviously it would be very difficult to get an exact estimate, but perhaps I may ask you this. In terms of international comparisons, would you put anything like equal weight on the importance to the national economy of imported technology as contrasted with domestically initiated and developed technology?

Senator Connolly: In Canada.

Senator Grosart: I said "domestically."

Senator Connolly: In Canada though.

Senator Grosart: Yes.

Dr. Okita: In Canada. I cannot say very definitely they have a program in Canada. In Japan we do not mind if the share of imported technology goes up. Our concern is rather the balance of technology trade.

I quoted a figure of one hundred to eleven in raising rates last year of this payment for technology import and what was received by exporting technology from Japan. For European countries this figure is around 30 per cent, 40 per cent of their payment, in France, in U.K., Germany; but in the case of Japan this is 11 per cent.

Our purpose will be gradually to raise this receipt from exporting our technology, and we do not aim at attaining any measure of self-sufficiency in our technological development, because we rather encourage the import of foreign techniques which are the products of the best brains all over the world. Instead, we also encourage the export of products of Japanese scientists and engineers to foreign countries. This is more or less our attitude for this program.

Senator Grosart: To what extent, if any, have you found that the low level of domestic R & D in Japan affects your capability to absorb the results of foreign R & D?

Dr. Okita: This is a very important question. So far, economically, there are various other factors such as difference in wage levels, difference in availability of capital and other factors of production. So far, because of the difference in wage levels mainly, we are importing technology, although the technology may be second-hand, but products produced by using imported know-how are in many cases competitive in our market. That was one advantage we have enjoyed in the past so far, but this gap is gradually narrowing, and we feel we shall have to depend

more and more upon our own development, and to introduce cross-licence agreements with foreign companies. That is the general point.

In connection with this, I came across during our field trip the views expressed by Canadian industrialists and some research institutions, that because of the small market of Canada of 20 million population, in many cases the development of new industries based on Canadian technology faces difficulties; but I also felt that there may be the possibility of developing a certain line of specialization in technology, in the application of technology, such as in the case of Swedish industries (and there are some other cases, and also some in our Japanese industries) to serve the U.S. market.

So that, in a sense, although in Canada the population is 20 million, in certain branches of industry and technology you might as well consider you have a 220 million population market of the highest income in the world. I think this kind of approach could be feasible for certain lines of specialized industry.

Senator Grosart: It has been said that one of the reasons for your success in the modern world is that Japan maintains, in effect, a very sophisticated international science information or intelligence network. Is this a government program?

Dr. Okita: In fact this has not been very much a plan; but historically in Japan, as one of the backward or latecoming nations, so naturally, historically, we developed a system of collecting information. Scientists and engineers especially are very carefully looking at foreign publications.

As a matter of fact, in recent years we are sometimes criticized by the developing countries that Japan is one-sided, in the sense that Japan has been anxious to import foreign know-how, but, in a sense, very inactive in trying to export their experience to newly-developing countries. I think this is more on historical background than government policy.

Senator Grosart: My last question, Mr. Chairman, because I know my colleagues have many questions to ask, is one that Dr. Solandt suggested I might ask you, Dr. Okita. He said there was a very interesting relationship developed between your Science and

Technology Advisory Council and the Cabinet in the area of political decision-making for science policy. What is the relationship, or, to put it more simply, do you have a Minister of Science Policy?

Dr. Okita: We have a Science and Technology Agency. This agency is somewhat similar to a ministry, and it is headed by a full Cabinet minister, so science and technology has representation in the Cabinet through this minister in charge of the Science and Technology Agency.

Senator Connolly: What is his name?

Senator Grosart: His title or his name?

Senator Connolly: No, his name.

Dr. Okita: Nabeshima.

Senator Connolly: Was he the man who was at the Ministers' meeting?

Dr. Okita: Yes.

Senator Grosart: What is his actual title?

Dr. Okita: Minister of State in charge of the Science and Technology Agency. Both the Science and Technology Agency and the Economic Planning Agency belong to the Prime Minister's office, headed by a Cabinet minister.

Senator Grosart: My final supplementary point on that: does he have any authority over departmental science policy, that is science policy as it develops in the departments? Does he have the right to initiate a general audit and report to the Cabinet?

Dr. Okita: He has the power to co-ordinate the science and technology activities of various ministries; but in fact because of, as mentioned, the older ministries such as the Ministry of Education, the co-ordinating power is not as strong as it should be.

Senator Grosart: That is all, Mr. Chairman.

[Translation]

Mr. Pigioli: I should perhaps like to expand on a few points. The first is relative to what Mr. Okita said on collecting information.

When I was very rushed and had to prepare a conference on a certain chemical topic very rarely was I unable to find a Japanese article synthesizing all known data—a perfectly remarkable article which I could have

translated. I feel that this is one of the factors which has enabled Japan to advance so rapidly, to assimilate so quickly and intelligently and to go one step beyond the knowledge others have acquired. I feel this is a very important fact.

The second point I should like to emphasize is the balance between patents and licences. I should like to trace the history of the relationship between the importation and exportation of patents between France and the United States.

Twenty years ago our balance was almost at an equilibrium. This simply means that we were not able to assimilate American technology. We were very proud of this equilibrium—but it was meaningless. At the present time the ratio is somewhere around 1 to 5; we purchase 5 times as many licences as we sell to the United States, approximately the same ratio as our population. We can therefore rightfully state that we in France are as inventive as people in the United States. Unfortunately, the curve which began at 1 and has increased to 5 does not seem to be stabilizing; it seems to be constantly rising, and this would be a weakness.

We readily admit that we are importers of technology from a country 5 times as great as we are, but I should not like to see imports continue to increase indefinitely. This is a trend which must be watched closely.

The third point I should like to stress is that when we analyze an import and export policy, some aspects do not appear. When an American firm locates in France, for example, the joint use of patents is not taken into account. The fact is considered sometimes in shared capital, sometimes in dues for technical assistance but does not necessarily appear on the level of licences and patents. In this case, the national efforts do not seem to be taken into account. The overall balance may be unfavourable.

On the other hand, the laboratory of an American firm in France may provide an intellectual lead and have a profound influence on the policy of the parent firm in the United States. A case in point is Kodak, where the Kodak laboratories in France have greatly contributed to and influenced the policy of the Kodak Company in Rochester. But this fact does not appear on the export balance-sheet. Nevertheless, as regards national prestige, I feel this is a good thing.

The last point I should like to make is that in analyzing the structure of expenditures for a country, we are often inclined to isolate university expenditures even though they come from the federal or provincial government. But every budget is somewhat different. You therefore have the university budget, the budget for government research—federal or provincial—and industry expenditures.

What is important to consider here is not only the volume of these three expenditure but their flow. I do not know offhand all these flows for Canada—I shall have to look more closely into the matter—but I am persuaded that there is a minimum flow among the three sectors, which is essential.

When I was in Japan, I was astonished by the fact that these flows were definitely too weak. I believe they have since increased.

In France these flows were practically nonexistent ten years ago but have now greatly increased. Unfortunately, we do not have the criteria to assess the money by contract among these laboratories. We are in the process of studying this aspect which, I feel, is an important one.

These are the few comments which your interesting question suggested to me.

[Text]

Dr. King: If you would like, sir, I can give these figures now. The latest figures were from the Department of Industry here for 1965.

The Chairman: This is John Orr?

Dr. King: Yes; John Orr's study. The total is \$681 million. The percentage was 51.5 directly from the State; 31.2 direct from industry; 10.4 through higher education, through the universities; 2.1, non-profit research organizations; and about 4.8 was from abroad (American grants and things of that kind).

That means State plus universities—which are also the State—60 per cent, to 30 per cent from Industry—the reverse of Japan.

Senator Grosart: These are considerably out of date now.

Dr. King: They are considerably out of date, but it is unlikely that the proportions will be very different, and it may be even that the university figures are slightly low

because they probably do not represent the salaries of professors, many of whom spend quite a lot of their time doing research.

Senator Grosart: This is source of funds, not performance sector.

Dr. King: This is source of funds. The same tables have the performance as well.

The Chairman: Senator Thompson.

Senator Thompson: I was interested, Mr. Chairman, in the structure in the two countries, and I notice in Japan there is an advisory committee on science planning which I understand in the next session there would be passage to permit. You have a Science Council which is elected. Then you have an advisory council to the Minister of Education; advisory council to the Science Agency.

Then if I could just repeat, if I understand it, you had a commission, sir, (speaking of France) half elected by scientists, a quarter by the Minister of Education, and a quarter by the Prime Minister, which includes the Army and other parts.

Can I throw this out to you, that in looking at the structure of Canada, do you have a suggestion to us concerning weaknesses in our structure?

Senator Grosart: If we have a structure.

[Translation]

Mr. Piganiol: I think it is still a little too early to answer that question as we have not yet had time to make a thorough analysis.

Mr. King: But we are not planning to do so.

Mr. Piganiol: We are going to make this complete analysis for Canada.

The only question I wanted to take up with you is this: in my opinion there should be several commission levels. In France at the governmental level, along with the ministers, there are 12 members appointed by the government. The events of May forced the addition of 12 elected members whose standing is not at all clear and which is rapidly changing.

The Chairman: Was this before the elections?

Mr. Piganiol: Yes, it was prior to the elections.

[Text]

Senator Thompson: May I interrupt? Those 12 scientists who are appointed, are they natural scientists?

[Translation]

Mr. Piganiol: No, they are men experienced in industrial, military and university research. They are appointed for a four-year term, and half of them replaced every two years. They are asked to study above all the integration of scientific policy with the whole government policy. They are asked to rise above their science problems.

The Chairman: An attempt to elaborate policy through science?

Mr. Piganiol: By science and with science—an introduction of scientific methods into government, a science policy, a policy by science and a balance between the two. However, at the CNRS level the commissions take on a much more professional aspect. It is a question of defining the main goals for a discipline or group of disciplines and determining the most effective method of quickly reaching the goals.

As you can see, they are two completely different levels.

I believe that here in Canada you are not far removed from such a structure, and during our study we shall try to find the similarities and the differences because it is an aspect of French policy which I consider totally valid—the scientist present at the political level and the scientist taking charge of their own scientific affairs. I hope that an increasing number of scientists can be brought into governmental decision-making.

In France, the scientific body was asocial, which is to say, completely alienated from the problems of society. In the past ten years, scientists have had new thoughts as to a national and international political integration.

I must add immediately that contrary to many other experiences, our contacts with Canadians at all levels show an overall comprehension of the scientific policy problem which in my opinion is quite exceptional.

[Text]

Senator Thompson: Could I ask your distinguished Japanese representative this question? My feeling is that the Japanese scientific community is not asocial in terms of

their working very much towards both the export opportunities as well as developing the industry of Japan.

In your travels, looking at your structure, do you see areas in which we could develop in Canada—for example, in a Ministry of Science? Would you be prepared at this point to make suggestions to us? Am I going too quickly?

Dr. Okita: It is all right.

Senator Connolly: You may be going too far.

The Chairman: I must say, Senator Thompson, that the main purpose of asking the OECD representatives to appear before us this morning, was not to ask them questions about Canada, because this is dealt with in their report, but more on their intimate knowledge of science policy in their respective countries.

Senator Thompson: Perhaps I will withdraw this question if it is embarrassing to you. This is just so much in our thoughts in our Committee.

Dr. Okita: We are discussing this aspect. As to what we should recommend and what we should write in our report, we have not reached any agreement amongst us, and we should therefore refrain from making any concrete suggestions.

Senator Thompson: I appreciate the point.

Dr. Okita: I would just like to give some more detail to my earlier statement. Last year we spent American \$240 million for importing technology, and we exported American \$27 million of technology to foreign countries.

Our total expenditure on research and development last year was around American \$1.6 billion. That is about 1.3 per cent of Gross National Product, which last year was American \$120 billion roughly.

The Chairman: Senator Connolly.

Senator Connolly: I had so many questions, Mr. Chairman, that I am ashamed of myself. I can only ask...

The Chairman: You are not the only one.

Senator Connolly: I know, because this has been a most interesting session.

There is one thing I would like to say, however, and that is how delighted I am to

see students from the university here. I wish that the opportunity for students to listen to these discussions were greater than it is, but the geography of our country makes this impossible. It is very encouraging, I think, to all of us to see students from the University of Ottawa coming here to hear such distinguished witnesses as we have had this morning. I congratulate them and their universities. I only wish that other universities had the same opportunities as they have.

Perhaps I could begin by asking Dr. King a question that is on my mind. I know the great work that OECD is doing in a great many fields, in the economic field, and I am most impressed with the inquiries that are being conducted under its auspices in the field of science. I am sure that all the twenty-one different countries in OECD will profit immeasurably by the kind of investigation and report which these gentlemen make, and which others who will succeed them will make from time to time.

What I particularly wonder about is whether or not the value of the work that is done for OECD countries in this field of harmonizing information in the field of science will spill over into the under-developed "third world". This is, I think, one of the great responsibilities of the developed world, and the developed world is pretty well represented by OECD countries.

I am afraid I am making a speech, but it seems to me that there is some comparison and perhaps some lead to be gathered from the work done under the Marshall Plan, where Europe was in effect re-established and rebuilt because of the facilities, and particularly the financial resources, that were put at its disposal; and they did it because there was a base from which to work and this made the process a fairly rapid one.

The proof of that is perhaps the position of West Germany to-day, and indeed of other countries that were devastated by the war. You have not got that base in the under-developed countries.

Could I ask Dr. King, and perhaps his colleagues here, whether they work that they do on behalf of OECD countries will have a direct effect, and indeed perhaps an indirect effect, through the developed countries, upon raising the level of technology, and perhaps even of innovation, among the developing countries?

Dr. King: Mr. Chairman, this is a very complicated and very important question. OECD, as you realize, is a group of the advanced countries of the market-economy world and, as such, its chief job is in fact discussion at a level of sophistication appropriate to their needs; but, nonetheless, of course, much is discussed which has relevance on a world level, and there are many examples of how this kind of thing does spread.

Within OECD itself, first of all, there is the general function of co-ordination of aid, and our member countries give about 94 per cent of the total aid that is given in the world, through bilateral and multilateral schemes, the harmonization of which is extremely difficult because of the political objectives which are behind the aid policies of some countries, either overt or covert.

However, the aid problem is very central to the thinking of OECD as donor countries who wish this to be as effective as possible; but the organization as such has no function in technical assistance. We agreed from the beginning that this should be so, because there are already probably too many bodies in the field competing to some extent and not always reinforcing one another. So a special approach has to be made on this.

With regard to spreading of the knowledge which is generated for the purposes of the OECD countries, there are a number of examples of how this is done. Firstly, much of the technique spreads through other international organizations. For example, UNESCO has followed up in its own way many of the approaches of OECD in providing good statistics on research and development.

Secondly, OECD in itself has a number of under-developed countries within the European scene—at least, semi-developed, like Turkey, Yugoslavia, Portugal.

Clearly, our approach to such countries in helping them in science policy must be very different from our approach to, say, Sweden or Switzerland, Canada or the United States, and a special approach has been developed within the science directorate of OECD with regard to these countries, through the creation of pilot teams for technology which consist of nationals of the country under examination, and who are natural scientists, engineers and economists.

The inter-relation between these disciplines is absolutely essential to this kind of activity, because the scientist by himself can do very little in this; the economist himself is too general; and the engineer is perhaps too *ad hoc* in his approach.

So these are combined groups who have done studies in countries, financed fifty-fifty by OECD and by the country in question, to lay out an inventory of what is going on in the country and to suggest means whereby their science effort may be made more relevant to the national needs, and particularly in relation to the development and implementation of national economic plans.

This has gone rather well, and a series of methodologies have been developed for the linking of scientific planning and national planning for countries at an early stage of development.

Senator Connolly: Does this extend to Africa and South-east Asia?

Dr. King: No, sir. So far this is only the OECD under-developed member countries, because we have no function and no right to go outside.

Senator Connolly: Yes.

Dr. King: But it is clear that many of these methods have as wide a significance, and we are looking at the moment for means whereby the techniques can be spread.

This also took place in our educational work, because the science directorate of OECD has pioneered the concept of educational investment planning, and has in fact developed the methods within countries like Greece, Turkey and Spain and Italy.

This became so clearly relevant in other places that the Ford Foundation gave us a grant of half a million dollars a few years ago to try out these techniques in Latin America. We have in fact done a full-scale, long-term educational plan for Peru and one for Argentina, which are published and which give guide lines of educational development in terms of overall national needs (essentially economic, but also to some extent social) which, if political stability permits, will help the countries enormously. With this we have done a great deal of training by apprenticeship of Latin Americans in this kind of educational planning so that in their own countries they can carry it on. Then we withdraw.

because we do not wish to compete with existing agencies in that field, international like ILO or UNESCO, and regional such as the Organization of American States.

As far as pilot groups for technology are concerned, we are now at a stage where at least ten countries have informally written in to see if we can help them—countries like Iran, India, Mexico, Egypt and so on.

We had a seminar last year to which we invited a number of outstanding representatives—mainly economic—of such countries, to discuss the methods we had developed, to see if they could be of use in their countries.

This is leading, in the end of this year or the beginning of next year, to a broad seminar run by the Development Centre of OECD, which is a semi-independent body; whereby a number of scientists and economists from a group of countries in the "third world" will come to Paris to spend a week discussing these methods, to see in fact how they can be implemented.

Also, a number of bodies such as the Inter-American Bank and, for that matter, the World Bank, have been following this with interest, and we hope that through this seminar other bodies providing funds will take up these methods.

So I think we can take it, sir, that we are very concerned that this knowledge should not be restricted to member countries, and as far as we can within our constitution, we are trying to do something about it, mainly with the help of external money.

The Chairman: I think Mr. Piganiol would like to say something.

[Translation]

Mr. Piganiol: Senator, you have given me the opportunity to say something to the OECD which I have never said to them. I am an advisor to the Government of Senegal for scientific and technical development, and I must say that my duties in Senegal are greatly aided by all the studies of the OECD, not only studies on partly-developed countries, such as Spain and Portugal, but also studies on developed countries. The problem I encounter in these countries is of a completely different nature. Scientific and technological change must be accompanied by social change. We are very poorly equipped to select them, and to select them with local people. It is not a question of adopting the

structure of industrialized countries but of creating a new and temporary social structure, temporary in the sense that it avoids ready-made dogmas which take over with the rigidity of religious infallibility and for this we are ill-equipped. Also it does not concern the plan of methodical thought. I do not think that it could work effectively in Senegal without the basis or background which is supplied to me abundantly by the endeavours of the OECD.

This was an opportunity to thank Dr. King who investigates and promotes them.

[Text]

Senator Connolly: This strikes a very responsive chord in my thinking. I remember Mr. Kristensen, the Secretary-General, at the dinner he gave for the science ministers of OECD, saying that he was a social scientist primarily and he would hope that the science ministers would not be concerned entirely, first of all with the development of science and technology for the purpose of economic development only, but also for the purpose of social development; taking into account, I think it is proper to say, the conditions in the country that Mr. Piganiol has mentioned—the cultural level, the technical base, the educational level, the literacy level even, if you will.

Do you find, Dr. King, that some of that objective is being realized in the work that you are doing with your OECD investigatory groups like this one?

Dr. King: That is a very difficult question, Mr. Chairman, and one which I think requires a great deal of attention.

Mr. Kristensen himself in a recent speech said that he had come to the conclusion that we had reached a point in our civilization where it is no longer possible or desirable to plan economic growth, except in a social context.

I think more and more in OECD we are convinced that nearly all the great problems we will be facing in the future—outside of the defence problems which I do not want to talk about—urban development, living in an increasing urban environment, transportation, the nature of our resources, and many, many more: cannot any longer be attacked simply by the scientists or separately by the economists; and that this combined scientific, economic and behavioral science approach must become established.

I would just like to take the opportunity here of saying that in my view the establishment of a science policy in a country must in its thinking take into account this need for multi-disciplinary approach which the new world in which we are entering demands, and without which we will fail. The student difficulties are merely a symbol of a much bigger and deeper problem of this kind. A science policy body in a country should also, in its changing of national structures, attempt to provide a flexibility which is not uni-disciplinary; which prevents the uni-disciplinary sterilization, if you like, which is built into the organizations of most of our countries. The points you have made are absolutely central to this.

Senator Connolly: Thank you. Mr. Piganiol, I think, has raised this question too. It seems to me that if you could put it in a very brief statement, it would be helpful.

One of our problems is that we are too inclined to specialize, and what we should be looking at in areas like this, as we look at the problems of the world, is the development of the whole man, not just the scientific man, not just the economic man, but man as man; and that all of these aspects of his social and domestic life have to be taken into consideration if the progress is to be a balanced and reasoned one.

I would just like to ask one or two other questions. I am late for another Committee now by an hour, but it is probably over, so perhaps it does not matter.

I wonder if I could ask Dr. Okita, first of all, the sources of the technology imported into Japan; from what countries do they come?

Dr. Okita: Technology import comes from the United States in large measure, and from U.K., France, Switzerland, Sweden, Germany, Netherlands to a certain extent, and those are the major sources. I do not remember accurately off hand, but probably 70 per cent of our technology imports are from the United States.

Senator Connolly: I would have thought perhaps the answer might have been in that area.

Now may I ask this question. In the case of technology imported from the United States, is the bulk of that the result of the formation

of U.S. subsidiaries or agencies or branches in Japan, or does it originate from the use of any innovation material, such as patents and techniques and things like that, which Japanese firms, who are so practical in their work and in their outlook, take in and work upon?

Dr. Okita: In this respect our approach was somewhat unique—that is, the separation of technology imports from capital and management imports.

Historically since the early period of modernization, and again after the Second World War, most of the technological imports were separated from imports of management and capital. Mostly they are imported in the form of patent licences, royalties and others; and there are relatively few cases of the management participation of foreign firms; but quite recently, because of the size of the output of Japanese industry, growing larger and larger, and maybe because of the competitiveness of those products, the foreign firms are more interested in participating in management and capital to share the profit. So there is a kind of request coming from foreign governments, particularly from the U.S. Government, that Japan should open up their domestic market to industries for foreign participation.

This is one of our current issues, and because of the growing possibility of the development of multi-national enterprise in various fields, where the technological progress is rather rapid, we also feel that we should gradually open up so that foreign companies may participate in our domestic industries, and Japanese companies may participate in other countries.

Such internationalization of industry will be inevitable, but at the same time we feel that we should maintain a kind of national integrity. Especially, if we are very much concerned with maintaining the research and development manpower in our own country, which will enable us to evolve our own technology that can be traded with other countries. That is one of our most important issues, how to maintain and foster their capability of making technological progress, even with wider foreign participation in our industry.

The Chairman: A brief one?

Senator Connolly: It is really quite a brief one, and it applies to both of our distin-

guished guests. In the case where you have foreign subsidiaries coming to your countries to develop, do you try to have them do more and more research and development work within your country rather than import it from their parent organizations?

Dr. Okita: In the case of Japan, this has been our more or less traditional policy, to strengthen the capabilities in our own country; but at the same time, as I mentioned, we must recognize that these international activities are growing very fast.

[Translation]

Mr. Piganiol: In France, we are trying to persuade established foreign firms to take part in research in order to first of all avoid the drain of scientists and also for these firms to be really involved in national life. I fully realize that from time to time nationalistic tendencies influence these firms but on the whole it can be said that the trend is favorable for their integration. I shall give you two examples—the Kodak laboratory and the I.B.M. laboratory, which in France are very important centres.

On the other hand, the multinational French firms established abroad have increasingly adopted a policy, once their development has reached an advanced stage, of setting up a local laboratory abroad. We have them in Germany and in Italy and shall soon have one in Spain.

The question which arises in the case of multi-national firms is of deciding whether it is better to have a large international laboratory, staffed by scientists from various countries where we are established, or to have several affiliated laboratories.

I believe that the future will lead to a central laboratory for basic problems which must really be solved in the firm's mother country, and more specialized laboratories in other countries where it is established. Each of the central and subsidiary laboratories will have an international team because experience has shown that the presence in a laboratory at the same time of Latin, Anglo-Saxon and Germanic temperaments is highly beneficial to thought.

I think that this will be the trend in the future and it has only begun.

The Chairman: Senator Giguère?

Senator Giguère: You said that in France, in order to coordinate scientific research, the research budgets of all the ministries are analysed at the same time?

Mr. Piganiol: Yes.

Senator Giguère: Who makes these analyses?

Mr. Piganiol: The analysis is done at the general research board level which discusses with each ministry its research projects by trying to establish an overall balance. This is then discussed at governmental level which sets the total amount for research.

Then, in general during the month of August, each ministry through officials discusses with the Ministry of Finance the size of its own research. However, the research board is in attendance and ensures that the total policy is upheld. At this time, a few small changes may be made.

In other words, we are trying to maintain the responsibility of each ministry while at the same time taking a total outlook of the whole picture. As a result the ministries which were not very interested in research, agriculture in particular in the fifties, became fully aware of the problem and their interest is evident.

The difficulties which may be encountered in the plan are easily solved. In France this is an austerity year and the drawing up of the budget is rather painful but we think that it will begin again later on.

[Text]

Senator Thompson: This General Delegation reports to the Prime Minister, reports to the highest level, does it?

[Translation]

Mr. Piganiol: That is correct. The budget is set by the interministry committee.

The Chairman: Senator Robichaud?

Senator Robichaud: I realize the hour is late, but allow me a short question about the import and export of technology. Are industries in France, for example, free to exchange scientific knowledge or is this controlled by the government?

Mr. Piganiol: There is governmental control over the exit of capital. In theory, at the technologist exchange level up until now everything important has been accomplished, with some difficulty at times, but on the

whole it has been easily brought about. In other words, everything is done as if there were real freedom. A control is exerted but with leniency.

The Chairman: Democracy, yes, but—

Mr. Piganiol: May I draw your attention to one fact as it is a problem we encountered in France in 1958-60.

We often noticed that our manufacturers knew less about results in French universities than those of American universities.

In the field of publications, even at the level of popular magazines, there is a marked American influence. In a country the size of France there is a problem of informing these manufacturers about work undertaken by the universities.

I think you have the same problem in Canada, for I know of several basic scientific research projects in the universities which are very interesting and which definitely would have a bearing on the technological development of the country if they were done as applied research by industries. However, I am not sure whether your industry is aware of the quality of the work being carried out in some of your industrial centres and this at a time when Canada is trying to assert its individuality, the originality of its culture,

without however comparing it to others, of course. I ask myself whether it would not be wise to find a national information media which could show clearly the scientific endeavours of the country which have met with success and thus open the door to the future. With a very limited knowledge of what is going on in Canada, I believe this might be something to try and set up in your country. Personally, I am amazed at the quality of some university projects.

[Text]

Senator Connolly: There is a certain practical wastage, in other words.

[Translation]

The Chairman: Are there any other questions. Unfortunately I think that we should adjourn.

[Text]

I know that our guests have to attend a meeting with the Treasury Board at two o'clock. Before concluding this meeting I would like, on behalf of the committee, to express our deepest gratitude to Dr. King, Dr. Okita and Mr. Piganiol for spending all this time and with us this morning. Merci beaucoup.

The committee adjourned.



First Session—Twenty-eighth Parliament

1968

THE SENATE OF CANADA

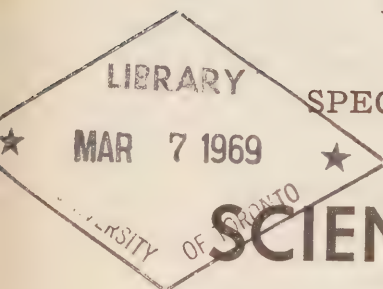
PROCEEDINGS

OF THE

SPECIAL COMMITTEE

ON

SCIENCE POLICY



The Honourable MAURICE LAMONTAGNE, P.C., *Chairman*

The Honourable DONALD CAMERON, *Vice-Chairman*

No. 13

WEDNESDAY, NOVEMBER 27th 1968.

THURSDAY, NOVEMBER 28th, 1968.

WITNESSES:

Department of National Health & Welfare: Dr. J. W. Willard, Deputy Minister; Dr. R. A. Chapman, Director General, Food and Drugs; Dr. J. B. Bundock, Principal Medical Officer, Special Projects; Dr. Gordon Josie, Assistant Director-General, Health Services; Mr. J. E. E. Osborne, Director, Research and Statistics Division; Dr. J. B. Murphy, Section Head and Consultant, Research Development Section; Dr. Brian J. Iverson, Director, National Welfare Grants Division.

APPENDIX:

11.—Brief submitted by the Department of National Health and Welfare.

QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1969

MEMBERS OF THE SPECIAL COMMITTEE
ON
SCIENCE POLICY

The Honourable Maurice Lamontagne, *Chairman*

The Honourable Donald Cameron, *Vice-Chairman*

The Honourable Senators:

Aird
Belisle
Bourget
Cameron
Desruisseaux
Grosart

Hays
Kinnear
Lamontagne
Lang
Leonard
MacKenzie

O'Leary (*Carleton*)
Phillips (*Prince*)
Robichaud
Sullivan
Thompson
Yuzyk

Patrick J. Savoie,
Clerk of the Committee.

ORDERS OF REFERENCE

Extract from the Minutes of the Proceedings of the Senate, Tuesday September 17th, 1968:

"The Honourable Senator Lamontagne, P.C., moved, seconded by the Honourable Senator Benidickson, P.C.:

That a Special Committee of the Senate be appointed to consider and report on the science policy of the Federal Government with the object of appraising its priorities, its budget and its efficiency in the light of the experience of other industrialized countries and of the requirements of the new scientific age and, without restricting the generality of the foregoing, to inquire into and report upon the following:

(a) recent trends in research and development expenditures in Canada as compared with those in other industrialized countries;

(b) research and development activities carried out by the Federal Government in the fields of physical, life and human sciences;

(c) federal assistance to research and development activities carried out by individuals, universities, industry and other groups in the three scientific fields mentioned above; and

(d) the broad principles, the long-term financial requirements and the structural organization of a dynamic and efficient science policy for Canada.

That the Committee have power to engage the services of such counsel, staff and technical advisers as may be necessary for the purpose of the inquiry;

That the Committee have power to send for persons, papers and records, to examine witnesses, to report from time to time, to print such papers and evidence from day to day as may be ordered by the Committee, to sit during sittings and adjournments of the Senate, and to adjourn from place to place;

That the papers and evidence received and taken on the subject in the preceding session be referred to the Committee; and

That the Committee be composed of the Honourable Senators Aird, Argue, Bélisle, Bourget, Cameron, Desruisseaux, Grosart, Hays, Kinnear, Lamontagne, Lang, Leonard, MacKenzie, O'Leary (*Carleton*), Phillips (*Prince*), Sullivan, Thompson and Yuzyk.

After debate, and—

The question being put on the motion, it was—

Resolved in the affirmative."

Extract from the Minutes of the Proceedings of the Senate, Thursday, September 19th, 1968:

“With leave of the Senate,

The Honourable Senator Lamontagne, P.C., moved, seconded by the Honourable Senator Benidickson, P.C.:

That the name of the Honourable Senator Robichaud be substituted for that of the Honourable Senator Argue on the list of Senators serving on the Special Committee on Science Policy.

The question being put on the motion, it was—
Resolved in the affirmative.”

ROBERT FORTIER,
Clerk of the Senate.

Proceedings of the
SPECIAL COMMITTEE ON SCIENCE POLICY

Issue No. 13

(Afternoon Sitting)

November 27, 1968.

E-R-R-A-T-U-M

Page 1303, column 2, line 25,

					Delete line 25 and substitute therefor: "of the National Welfare Grants pro- gram, and Miss"
"	"	"	"	52,	Substitute "\$3.6" for "\$3.8"
1308,	"	1,	"	21,	Substitute "Josie's" for "Chapman's"
1310,	"	"	"	48,	Substitute "etiology" for "edeology"
1314,	"	"	"	40,	Delete line 40 and substitute therefor: "Now, it is not the sulphur dioxide in the smog that causes"
"	"	"	"	42,	Delete line 42 and substitute therefor: "which is a gas, it combines with oxygen in the air and with water to"
"	"	"	"	44,	Substitute "sulphuric acid" for "it"
"	"	"	"	51,	After the word "air" insert the words "plus the SO ₂ "
1316,	"	"	"	2,	Substitute "late forties" for "early fifties"
"	"	"	"	26,	Before the word "Medical" insert the word "Defence"
1318,	"	2,	"	31,	Substitute " Josie " for Bundock " and "Chap- man" for Josie"
1319,	"	"	"	24,	Substitute "some" for "the southern"
1320,	"	1,	"	34,	After the word "more" insert the word "sea"
"	"	"	"	48,	After the word "problems" insert the words "in the Lachine Canal."
1321,	"	"	"	12,	After the word "through" insert the word "our"
"	"	"	"	13,	Substitute "offices" for "officers"
"	"	"	"	14,	After the word "as" insert the words "we do"
1322,	"	"	"	40,	Substitute "per capita" for "matching"
"	"	"	"	41,	Delete line 41 and substitute therefor: "a research element of \$175 million which is also on a"
"	"	"	"	42,	Delete "non-"
"	"	"	"	43,	Before the word "special" insert "non- matching"
"	"	"	"	50,	Substitute "\$33" for "\$30"
"	"	"	"	51,	Substitute "requests" for "submissions"
"	"	2,	"	14,	Before the word "committee" insert the word "statutory"
"	"	"	"	45,	Substitute "pharmacy and nursing." for "veterinary"

Page 1322, column 2, line 46,

1323, " 1, " 22,

" " " " 48,

Delete line 46 and substitute therefor:
"Social sciences are included in some
instances."

Delete line 22 and substitute therefor:
"which is just starting; it has gone on
for only two years."

Substitute "Our" for "Each"

(Morning Sitting)

November 28, 1968.

E-R-R-A-T-U-M

1326, " 1, " 45,

" " " " 51,

" " 2, " 38,

" " " " 42,

1327, " 1, " 3,

" " " " 7,

" " " " 13,

" " " " 21,

1329, " " " 23,

substitute "Bundock" for "Josie"

substitute "Bundock" for "Josie"

substitute "Chapman" for "Josie"

substitute "Chapman" for "Josie"

substitute "Bundock" for "Josie"

substitute "Bundock" for "Josie"

substitute "Bundock" for "Josie"

substitute "Bundock" for "Josie"

after the word "market" insert the words
"without the issuance of a notice of
compliance,"

1330, " " " 21 &
22,

after the word "preparations" insert the
words "requiring laboratory investi-
gation."

" " 2, " 7,

substitute "Bundock" for "Josie"

" " " " 32,

Substitute "\$6" for "\$7"

1335, " 1, " 23,

substitute "Bundock" for "Josie"

MINUTES OF PROCEEDINGS

WEDNESDAY, November 27, 1968.

Afternoon Sitting
(first session)

Pursuant to adjournment and notice the Special Committee on Science Policy met this day at 3.30 p.m.

Present: The Honourable Senators Lamontagne (*Chairman*), Grosart, Kinnear, Leonard, Robichaud and Thompson. (6).

Present but not of the Committee: The Honourable Senators Giguere and Haig. (2)

In attendance:

Philip Pocock, Director of Research (Physical Science).

The following witnesses were heard:

DEPARTMENT OF NATIONAL HEALTH AND WELFARE:

Dr. J. W. Willard, Deputy Minister.

Dr. R. A. Chapman, Director General, Food and Drugs.

Dr. J. B. Bundock, Principal Medical Officer, Special Projects.

Dr. Gordon Josie, Assistant Director-General, Health Services.

Mr. J. E. E. Osborne, Director, Research and Statistics Division.

Dr. J. B. Murphy, Section Head and Consultant, Research Development Section.

Dr. Brian J. Iverson, Director, National Welfare Grants Division.

(A curriculum vitae of each witness follow these Minutes.)

At 5.45 p.m. the Committee adjourned until Thursday, November 28th, at 10.00 a.m.

Morning Sitting
(second and final session)

THURSDAY, November 28th, 1968.

The Committee resumed at 10.00 a.m. this day, Senator Lamontagne in the Chair.

Present: The Honourable Senators Lamontagne (*Chairman*), Belisle, Grosart, Hays, Kinnear, Leonard, Robichaud, Thompson and Yuzyk. (9).

Present but not of the Committee: The Honourable Senator McGrand. (1)

In attendance:

Philip Pocock, Director of Research (Physical Science).

The witnesses heard at the afternoon meeting of November 27th were further questioned.

The following is printed as Appendix No. 11:

—Brief submitted by the Department of National Health and Welfare.

At 12.55 p.m. the Committee adjourned to the call of the Chairman.

ATTEST:

Patrick J. Savoie,
Clerk of the Committee.

CURRICULUM VITAE

Willard, Joseph W. Dr. Willard was born in Hamilton, Ontario, September 24, 1917. He grew up in St. Marys' Ontario where he received his early education. He married Geraldine Margaret Burnett and they have two children, a son John and a daughter Kathy. They reside at Pinehurst Lodge, Almonte, Ontario. Present Position: Deputy Minister of National Welfare, Department of National Health and Welfare. University Education: B.A. (Hon.)—Political Science and Economics, University of Toronto; M.A., Political Science, University of Toronto; M.P.A., Public Administration, Harvard University; Ph.D., Economics, Harvard University. Littauer Fellow at Graduate School of Public Administration, Harvard University 1945-46, 1946-47. Memberships in Professional Associations: Institute of Public Administration of Canada; Canadian Political Science and Economic Association; American Public Welfare Association; American Public Health Association; American Economic Association; Canadian Association of Social Workers; Canadian Welfare Council; Received annual award of the Gold Medal of the Professional Institute of the Public Service of Canada in 1964 for achievement in public service of Canada. Department of National Health and Welfare: Joined staff of National Health and Welfare in 1947. As Director of Research and Statistics Division played an important role in the development of Department's programs introduced since 1947, including the National Health Grants Program introduced in 1948, Old Age Security and Old Age Assistance in 1951, the extension of Health Grants in 1953, Allowances for the totally and permanently disabled in 1954, Unemployment Assistance in 1957 and Hospital Insurance in 1958. Research Adviser to the Joint Parliamentary Committee of House of Commons and Senate on Old Age Security, 1950. Served for a number of years on the National Advisory Committee on Rehabilitation of Disabled Persons and on the Executive Committee of the National Advisory Committee. Chairman of Hospital Survey Board which surveyed hospital facilities and personnel in the province of Manitoba, 1960-62. Deputy Minister of National Health and Welfare (Welfare) 1960 to the present. Responsible to the Minister of the Department for the administration of the Department's welfare programs which in the fiscal year 1968-69 involve expenditures of \$2.4 billion. Played an important role in the development of the Fitness and Amateur Sports Program, introduced in 1961, and in the National Welfare Grants Program, initiated in 1962, in the Canada Pension Plan Act in 1965, in the Canada Assistance Plan and the Guaranteed Income Supplement Program implemented in 1966 and 1967 respectively. Governor, National Film Board 1967, 1968. Special Assignment April-July 1968 to conduct an assessment of the Human Development Programs and report to the Cabinet Committee on Planning and Priorities. Participation in International Health and Welfare Activities: UNICEF, Canadian Representative on Board of UNICEF 1961-1967, Chairman of the Board 1966, 1967, 1968; Chairman of Program Committee 1964, 1965; Member of Program Committee 1962-1967; Member of Budget Committee 1961-1967. WHO/UNICEF JOINT POLICY COMMITTEE, GENEVA, 1967, as Chairman of the Executive Board of UNICEF. FAO/UNICEF JOINT POLICY COMMITTEE, ROME, 1967, as Chairman of the Executive Board of UNICEF. Social Commission, Canadian Representative. 1961-1963, Chairman of Commission, 1962, Rapporteur of Commission 1961; Chair-

man, Ad Hoc Committee on Social Welfare, of Social Commission, 1965. Conference on Children and Youth in National Development in Latin America, sponsored by Economic Commission for Latin America, the Latin American Institute for Economic and Social Planning and the United Nations Children's Fund, Santiago, Chile, 1965 as Chairman of Executive Board of UNICEF. International Conference of Social Work, Rome, 1961, Chairman of one of the Conference Commissions. Committee of Experts on Social Security, International Labour Organization 1956-1957, Chairman of Committee 1962, Raporteur of Committee 1960. International Labour Conferences, 1951, 1952, 1954, 1966, government adviser on welfare and social security matters. Committee of Experts on Public Health Administration World Health Organization, 1958 to 1967. Chairman of Survey Team and director of survey evaluating Public Health Services of Costa Rica in Central America, 1958. Short Term Consultant to Health and Welfare Planning Commission of the Commonwealth of Puerto Rico, 1960 concerning Puerto Rican Health Survey. Short Term Consultant in Medical Economics to Jamaican Government in connection with study of Blue Cross Hospital and Medical Care Plan and government operated Hospital and Medical Care Services, 1959. Interest in Group Work and Camping Activities: Associated with Ontario Boys' Work Board for a number of years; Premier of the 18th Ontario Older Boys Parliament; Canadian delegate to the World Conference of Christian Youth, Amsterdam, 1939. Associate Boys' Work Secretary at the Toronto Central Y.M.C.A., 1940; camp leader at camps operated by Ontario Boys' Work Board, Taylor Statton's Camp Ahmek and the Y.M.C.A. Unemployment Insurance Commission and the Department of Labour: Joined staff of the Unemployment Insurance Commission at the time of its establishment in 1941 as an assistant to the Executive Director of the Commission; for a time, seconded to the Department of Labour as assistant editor of the Labour Gazette. Department of National Defence: Statistician for the Canadian Medical Procurement and Assignment Board; in collaboration with Wing Commander Sellars of R.C.A.F. directed the National Health Survey, 1943. Administrative Officer in personnel and training branch of the Royal Canadian Army Medical Corps, reaching the rank of Major. In 1945, appointed executive secretary of the Canadian Medical Procurement and Assignment Board.

Chapman, R. A. Dr. Chapman received his Bachelor of Agricultural Science from the Ontario Agricultural College of the University of Toronto in 1940. The following year he received his Master of Science from Macdonald College, McGill University. In 1944, he received his Ph.D. from the same university. Dr. Chapman remained with McGill University for four years after receiving his Doctorate as an assistant professor in the Chemistry Department of Macdonald College. In 1948, he was appointed as Head of the Food Chemistry Section of the Food and Drug Directorate in Ottawa. Dr. Chapman was granted a two year leave of absence from 1955-1957 to serve as a scientist on food additives with the World Health Organization in Geneva. On his return to Ottawa, he continued in his position of head of the Food Chemistry Section until 1958 when he was appointed Assistant Director, Research Laboratories, of the Directorate. In 1959, he received the International Award of the Institute for Food Technologists for his contribution in furthering the international exchange of ideas in the food field. In 1963, he was promoted to the position of Assistant Director, Foods. In March, 1965, he was appointed Director-General, Food and Drugs. He has been a member of the Canadian delegation to conferences in Rome and Geneva of the Codex Alimentarius Commission sponsored by the Joint FAO/WHO Programme on Food Standards. He is a Fellow of the Chemical

Institute of Canada and in 1964 was elected a Fellow of Association of Official Analytical Chemists, Washington, D.C., the first Canadian to be accorded this honour. Dr. Chapman is a member of the Expert Panel on Food Additives of the World Health Organization in Geneva, Switzerland and has served on a number of its Expert Committees.

Bundock, Jean Benoît, born December 5, 1914, son of Evey Bundock and Emilie Gouédard in Québec City. Education: Brevet Science and Letters, Thomas Institute and Laval University, Quebec City, 1933. M.D. Laval University, Québec, 1938. Certificate of Tropical Medicine, Milbank College, London, U.K., 1942. Certificate as instructor in chemical warfare, School of Chemical Warfare, Leeds, U.K. 1943. Diploma in American Law and Procedure, La Salle University, Chicago, U.S.A. 1955. Previous experience: Chief intern, St.-François d'Assises Hospital, Quebec City 1937-38. Military Activities: Served in R.C.A.M.C. from 1939-66; Was instructor in military medicine including chemical warfare and tropical medicine between 1942-44; Commanded the following units during Western European Campaigns: 18th Canadian Field Ambulance, No. 2 Casualty Clearing Station, No. 11 Canadian Field Dressing Station, No. 6 Canadian General Hospital; Was Canadian delegate to attend post-war preparatory meeting of the International Association of Military Medicine and Pharmacy in Brussels, 1945. Was made Officer of British Empire Services, 1945. Active member of the Defence Medical Association since 1946, Past President of the Eastern Ontario Branch, 1967. Membership in Professional Associations: Fellow of the Royal Society of Health, England; Member of the Council of L'Association des Médecins de Langue Française du Canada; Member of the Institute of Public Administration; Lifetime member of L'Association des Anciens Auditeurs de l'Académie de Droit International, La Haye; Member, Canadian Public Health Association; Member-American Medical Writers Association. Department of National Health and Welfare: Joined the Department of National Health and Welfare in 1947, Officer-in-charge of Immigration Medical Office from 1947-54 The Hague, Holland; Canadian observer on Committee of Experts convened by International Social Security Association in Geneva, 1954 Canadian Consul at The Hague with jurisdiction throughout The Netherlands from 1947-49; Medical Attaché, Diplomatic Corps, The Netherlands, 1949-54; Adviser to the Canadian Delegation on Drafting Committee on International Quarantine Regulations, 1954; Adviser to the Canadian Delegation attending W.H.O. General Assembly in 1954; Assistant to the Principal Medical Officer, National Health Grants Administration 1954-63; Chairman, Editorial Board and Associate Editor of the Medical Services Journal, Canada, 1958 to 1967; Served as part-time consultant to the World Health Organization—Organized and completed a national health survey of Colombia, South America during 1968; Lecturer in Public Health Administration at the School of Hygiene and the School of Hospital Administration, University of Montreal since 1958; Vice-President of the Pierre Janet Psychiatric Hospital, Hull, P.Q., Serving, at present, as Principal Medical Officer, Special Projects and as scientific adviser to the Deputy Minister of National Health. Is married to Claire de Niverville. They have two sons and one daughter.

Josie, Dr. Gordon H., Education: University of Manitoba: B.Sc. 1932; M.Sc. 1935 (Physics) Johns Hopkins University, School of Hygiene and Public Health: M.P.H. 1951; Sc.D. 1957 (Biostatistics) Experience: Department of National Health and Welfare, since 1947, in Research and Statistics Division, 1947-1962,

Principal Research Officer (Biostatistics), in Directorate of Health Services and Health Services Branch—since May 1962 Consultant for Planning and Evaluation; now Assistant Director General. Consultant or Adviser to: International Joint Commission Technical Advisory Board on Air Pollution 1951-1956, meetings in Washington, Ottawa, Detroit; The Canadian Delegate at meetings of the United Nations Scientific Committee on the Effects of Atomic Radiation, New York, 1956-1959 and 1961; Department of Veterans Affairs re Hospital Morbidity Statistics (1959); Ontario Fluoridation Investigating Committee, Toronto (Expert Witness) 1960; W.H.O. Expert Advisory Panel on Health Statistics 1961 to present; Canadian Public Health Association Research Committee, since 1962, now Chairman; University of Toronto, School of Hygiene, appraisal of research potential, 1964; Canadian Delegation to the 18th World Health Assembly, W.H.O., Geneva, May 1965; PAHO Regional Office of the World Health Organization Health Planning Consultant, Barbados, February 1966. Recent Publications: "Job Analysis for Nursing Personnel", Gordon H. Josie. *Medical Services Journal*, Vol. XVI, No. 7. July-August 1960. "Diagnostic Groups for Hospital Statistics", Gordon H. Josie. *Canadian Journal of Public Health*. Vol. 51, No. 12, December 1960. "A Canadian Study of Mortality in Relation to Smoking Habits", E. W. R. Best, Gordon H. Josie, C. B. Walker. A Preliminary Report. *Canadian Journal of Public Health*. Vol. 52, No. 3, March 1961. "An Investigation of the Representativeness of 'Grab-Sampling' in a Sr⁹⁰-in-Dried-Milk Program: Preliminary Results", P. M. Bird, P. G. Mar, G. H. Josie, and F. Hobson. Published in *Radioactive Fallout from Nuclear Weapons Tests*. Proceedings of a Conference held in Germantown, Maryland. November 15-17, 1961. "Research Methods in Public Health. An Annotated Bibliography with Special Reference to Canadian Problems and Experience", Gordon H. Josie. *Canadian Journal of Public Health*. Vol. 54, No. 1, January 1963. "Highlights of a Survey of Health Unit Services in Canada", E. W. R. Best, W. H. leRiche, G. H. Josie, A. C. McKenzie. *Canadian Journal of Public Health*. Vol. 54, No. 8, August 1963. "Planning, Implementation and Evaluation of Community Health Services", Gordon H. Josie. (Discussion of a paper by Vlado A. Getting). *Canadian Journal of Public Health*. Vol. 55, No. 12, December 1964. "Local Health Services: Objectives and Assessment", Gordon H. Josie. *Medical Services Journal*. Vol. XXI, No. 6, June 1965. "Need and Opportunity for Public Health Research", Gordon H. Josie. *Canadian Journal of Public Health*. Vol. 58, No. 4, April 1967.

Osborne, John E., B.A., M.A., D.H.A. Mr. John E. Osborne was born in Hamilton, Ontario, was educated in Beamsville, Ontario and later at McMaster University, from which he graduated in 1943 with a Bachelor of Arts degree in political economy. Following this he served with the Canadian Army in Canada and overseas until 1945. He received a Master of Arts degree in economics from the University of Toronto in 1946. In the period 1946 to 1951 he was associate professor in economics and business administration at Waterloo College, (now Waterloo Lutheran University), Waterloo, Ontario, for one year, and was a lecturer in economics at McMaster University for two years. In this same period, Mr. Osborne completed two years of doctoral studies in economics at the University of Chicago. In 1951 he joined the Department of National Health and Welfare as an economist in the Research and Statistics Division, where he conducted research in the field of hospital and medical care. Granted educational leave in 1958, Mr. Osborne studied for two years at the University of Toronto, which granted him a Diploma in Hospital Administration in the fall of 1960. He received the Robert Wood Johnson Award on graduation from the course.

In June, 1960, he returned to the Department as Consultant in Hospital Administration. On August 23, 1961, Mr. Osborne was named Director of Research and Statistics. In recent years he has served as a member of the Task Force which designed the Canada Pension Plan; as Research Adviser to the Joint Committee of the Senate and House of Commons on the Canada Pension Plan; as a member of the Advisory Group on Medicare Statistics advising the Office of Research of the United States Social Security Administration; as a representative of the Canadian Government on the Social Security Committee of the 50th and 51st International Labour Conferences in Geneva in 1966 and 1967; as titular delegate of Canada on the International Social Security Association; and as a part-time lecturer at the School of Hygiene, University of Toronto. In July 1967 he and his family commenced one year of studies in French in Quebec City, where he attended Laval University as part of the Federal Government's Bilingual Development Program.

Murphy, J. B., M.D., MSc., D.P.H. Educational Background: M.D. University of Toronto, 1956; M.Sc. (Pharmacology), University of Toronto, 1959; Fellowship in Clinical Pharmacology, Johns Hopkins University Medical School, Baltimore, Md., 1959-1961; D.P.H. University of Toronto, 1966. Employment Background: Research Assistant, Department of Psychiatry, Toronto Psychiatric Hospital, Toronto, Ontario, 1953-1954; Part-time medical practice in City of Toronto, 1957-1959; Demonstrator, Department of Pharmacology, University of Toronto Faculty of Medicine, Toronto, Ontario, 1957-1959; Assistant Physician, Outpatient Department, Johns Hopkins Hospital, Baltimore, Md., 1959-1961; Chief Medical Officer, Food & Drug Directorate, National Health and Welfare, Ottawa 3, Ontario, 1961-1965; Medical Officer, Division of Epidemiology, Dept. of National Health & Welfare, Ottawa, 1966-1967; Section Head and Consultant, Research Development Section, Dept. of National Health & Welfare, Ottawa, 1967. List of Publications: 1) The Use of Metaraminol Bitartrate to Reduce the Side Effects of Atropine, Canadian Medical Association Journal, June 4, 1960; 2) Ineffectiveness of Chloridiazepoxide-HCl in Epilepsy, Journal of the American Medical Association, July 29, 1961; 3) The Effect of Dosage Regimen on the Diuretic Efficacy of Chlorothiazide in Human Subjects, Journal of Pharmacology & Exp. Ther. December, 1961; 4) The Influence of Environmental Changes on the Cardiotoxicity of Isoprenaline in Rats, Journal of Pharmacy and Pharmacology 14: 750, 1962; 5) The Effect of Tranylecypromine on the Blood Pressure Response of Tyramine, Nature, April 17, 1965; 6) Preclinical Drug Submissions, Applied Therapeutics November, 1965. List of Credits on Publications: 1) A Method for Evaluation of the Physiological Availability of Diphenyl Hydantoin by Urinary Analysis, Clinica Chimica Acta 8: 968, 1963; 2) Laetrile: A Study of its Biochemical and Physicochemical Properties, Canadian Medical Association Journal, May 15, 1965. List of Papers Presented at Scientific Meetings: 1) Posology and its Effect on Water and Electrolyte excretion by Chlorothiazide, American Federation of Biological Societies, Atlantic City, April, 1961; 2) Canadian Regulations governing New Drugs and their Interpretation in Respect of the Thalidomide Tragedy, Canadian Medical Association, Annual Meeting, Toronto, June, 1962; 3) Poison Control in Canada—A Program for Improved Treatment and Prevention of Accidental Poisonings, Canadian Pediatric Society, Annual Meeting, London, June, 1962; 4) Observations on Computer and other Data Processing Techniques and their Application to Canadian Drug Problems, American Chemical Society, Annual Meeting, Chicago, August, 1964; *5) Les Nouveaux Règlements des Drogues Nouvelles au Canada: Observations et Ex-

plications, L'Association des Médecins de Langue Française du Canada, Annual Meeting, Montreal, November, 1964; 6) Canadian New Drug Laws and their Application to New Oral Contraceptives, Symposium on Norinyl 1. Syntex Company Limited, San Francisco, July, 1965; *This paper was given by me in French. Papers in Preparation: (1) Epidemiological Investigation of Food Poisoning due to Salmonella Java in Whitefish from Great Slave Lake. (To be presented at C.P.H.A. meetings 1967. Publication to follow in Canadian Journal of Public Health.); (2) Epidemiology, Science or Method?, (A position paper for publication in Canadian Journal of Public Health, 1967.)

Iverson, Brian J. Born in Vancouver, British Columbia, 1927. Married, two children; Served in Canadian Army 1944-45. Attended University of British Columbia 1945-1950; B.A. Degree obtained 1949—political science, economics and sociology. B.S.W. Degree 1950. Academic requirements for M.S.W. completed 1954-1960; 1950, Commenced social worker career as a field worker with the Department of Social Welfare, Province of British Columbia; 1953, Appointed Director of the Municipality of Richmond Public Welfare Department; 1956, Joined the Community Chest and Council of Greater Vancouver as Budget Director responsible for financial relationships and program planning with sixty-six voluntary agencies; 1962, Joined the staff of the Canadian Welfare Council, Ottawa, as Executive Secretary, Public Welfare Division. Travelled extensively in Canada to work with provincial and local public welfare constituencies; 1965, Joined the Department of National Health and Welfare as Director, International Welfare Division. In that capacity participated in the preparation of international policy positions in the social sector, on Canadian delegations to various bodies at the United Nations, including the Commission for Social Development, the United Nations Children's Fund and the Third Committee of the General Assembly. Involved with Canada's External Aid program and the development of reciprocal arrangements in social security matters; Late 1967, Appointed Director, National Welfare Grants Division, where presently located. The program involves a series of matching and non-matching grants and consultation services to both public and private agencies in Canada for projects designed to help strengthen and develop welfare services; Association Memberships: Board of Directors of the Canadian Association of Social Workers for several years. Has held several senior offices with that organization; Executive Committee, International Federation of Social Workers; Canadian Public Welfare Association, Canadian Welfare Council; Professional Institute of the Public Service of Canada.

THE SENATE

SPECIAL COMMITTEE ON SCIENCE POLICY

EVIDENCE

AFTERNOON SITTING

(First Session)

Ottawa, Wednesday, November 27, 1968.

The Special Committee on Science Policy met this day at 3.30 p.m.

Senator Maurice Lamontagne (*Chairman*) in the Chair.

The Chairman: Honourable senators, I am pleased to introduce an old friend of mine from my days as a civil servant, Dr. J. W. Willard, Deputy Minister of the Department of National Health and Welfare. Dr. Willard has to attend another committee meeting later today, but this afternoon he will attempt to deal with our questions on health and tomorrow we can examine the welfare activities of the department. He will make a brief statement and introduce his colleagues.

Dr. J. W. Willard (*Deputy Minister, Department of National Health and Welfare*): Mr. Chairman, honourable senators, it is a pleasure to be with you this afternoon and to express on behalf of the Minister his interest in this committee and his regret at being unable to be present.

In the Department we are very conscious of the heavy responsibilities we have regarding research and scientific activity and the importance of that sector in terms of total science policy.

The kind of changing world we have today, with its impact upon society, makes us only too aware that health and welfare activities are in the forefront and that we must carry on research and scientific endeavours to catch up with a very dynamic society.

Dr. Crawford, my colleague, the Deputy Minister of Health is away; otherwise he would be here on this occasion to discuss some of the health activities. In his place I have Dr. J. B. Bundock, Principal Medical Officer in charge of Special Projects, who has been assistant to Dr. Crawford and who will take over when I leave shortly, to deal with the health aspects. Dr. Bundock was also chairman of the ad hoc steering committee on scientific policy for the Department, that brought these documents together.

As the Chairman has mentioned, I hope to be back with you tomorrow to discuss some of the welfare activities.

I would like to introduce the other members of the Department who are here, that is, Dr. R. A. Chapman, known to many of you, the Director-General of the Food and Drugs Directorate; Dr. Gordon Josie, Assistant Director-General, the Directorate of Health Services; Dr. J. B. Murphy, Director of the Division of Research and Development in the Directorate of Health Services. They are all from the Health Branch of the Department and can answer any detailed questions. There are also here Mr. J. E. Osborne, Director of Research and Statistics, who has a dual role, dealing with both health and welfare activities. He is located in the Central Services Branch of the Department, the Research and Statistics Division, which carries out research work for health activities and welfare activities alike. Tomorrow I will have with me two representatives of the Welfare Branch, Mr. Brian Iverson who is here today, the Director of the Welfare Branch program, and Miss Jean Carmichael, Assistant Director of the Fitness Amateur Sports Program.

I want to make special mention of the secretary of the committee that worked on this report, Mrs. Paltiel, who is to my right. It involved many months of work and, as secretary of that committee, she carried a great deal of the responsibility.

Mr. Chairman, the minister and the department are, as I said, particularly happy that this inquiry has come at this particular time because we feel not only in terms of the Government as a whole but in terms of our department that there is need for a systematic, critical examination of the organization of scientific activities. We are very anxious to make our contribution towards this inquiry and to have our work studied and looked at along with other parties of the Public Service and also to see where it stands in terms of science policy generally in Canada.

I have mentioned that there were three, as it were, branches of the department, the Health Branch, the Welfare Branch and the Central Service Branch. In the department as a whole we have about 7,500 employees. We have a budget of approximately \$3.8 billion, and we have scientific research activities

going on in different parts of the department. I might just mention a few of them. On the health side we have both intramural and extramural research activities. We have, for instance, in the extramural side, the National Health Grant, or National Grant Program, which includes research grants, particularly in the field of public health. We have activities that are of a research-scientific nature that are stimulated through the hospital and diagnostic services program. In addition to that we have activities outside the department that arise out of the work of the Food and Drug Directorate.

We have a fairly comprehensive intramural research program going forward which rises out of the various statutory provisions related to the department. Some of them are related to the Food and Drug Act, for example. Some of them stem from the general requirements of the Health and Welfare Act. We have a number of laboratories that grow out of these statutory requirements. For example, we have laboratories related to food and drug activities. We have a laboratory of hygiene. We have a virus laboratory. We have a laboratory that is concerned with environmental problems. Public health engineering is very much tied into this question of air and water pollution. We have a laboratory in the field of radiation protection. In addition to that, the research and development activities in the directorate of health services and the health research activities in the research and statistics division make a very important contribution to the research activity carried on from day to day within the department. On the welfare side of the department, the research activities are somewhat more limited, but nonetheless important. We have, for instance, a research grant under the National Welfare Grant Program, and we try to encourage research projects relating to welfare programs, relating to welfare problems, relating to problems of poverty in Canada and so forth. Under the Fitness and Amateur Sport Program we have a fitness research grant program and here a great deal of the research has been in the physiological effects of exercise, the physiological effects of sport, and we established three research units across Canada that have been carrying on in this field plus additional support for a large number of independent research projects that are submitted.

Then in addition to these two areas the research and statistics division has carried on a wide range of research activities for the department in relation to social development.

And the kind of activities in the past have tended to be program centred. They have tended to relate to particular program development whether it be the Canada Pension Plan or the Canada Assistance Plan or in the case of health, something such as hospital insurance. But more and more we have been thinking in terms of a broader orientation the possibilities of looking at social problems on a much broader spectrum. I think part of this development grows out of the fact that (a) many of the social security programs of today have been implemented in Canada so that our research is oriented more to some evaluation of some of those programs than to work on initiating such programs. But in addition to that, the fact that the orthodox type of social security program has not met successfully as it had been hoped over the years the problem of poverty has led to a great deal of soul-searching and a different approach to the whole question of research in this field.

I suppose that both in our welfare grants program and in our work in the research and statistics division it is fair to say it will not be as program oriented in terms of large-scale social security programs, and it may be more problem oriented in terms of the problems related to poverty and the different approaches that may emerge in terms of answers to those kinds of problems.

Mr. Chairman, the study you have before you, I should mention, looks a little voluminous, but I think there are useful things in there and you may want to pick and choose where you read.

The Summary and Recommendations section has been provided under separate cover for your convenience. It gives an overview of the material that has been prepared, and makes some suggestions of a general nature, a sort of summing-up of the way the department sees things in a broad perspective, and not picking up individual detailed programs and making suggestions about them.

Part I, which is the first big volume, deals with the organization and responsibilities for scientific activities of the department. It talks about the scope of scientific activities. It outlines the material on research and development, and provides some information on scientific and technical information activities. We have discussed at some length the training and retraining of manpower in our particular field. We have a number of programs that relate to training. These include profes-

sional training grants in the health field, the welfare field and in the fitness field. In some cases we are training research people definitely to fill some of the much needed manpower for the kinds of activities I have been talking about.

Part II is really related to the research output and expenditures related to departmental scientific activities and, finally, Part III relates to the problems and priorities affecting present and future scientific activities.

The conclusions and recommendations with respect to national science policy then come at the end of that volume.

Volume II deals with research output, and it is in this volume you will find material on the intramural and extramural research during the past five years, and we have also given selective case histories of the impact of the scientific activities of the Food and Drug Directorate for example, and a report on selected work of the research laboratories.

Mr. Chairman, that was a very quick summation to start the matter off.

The Chairman: Thank you very much, Dr. Willard. We come now to the usual question period. Senator Thompson?

Senator Thompson: Mr. Chairman, I wonder if I could ask several questions in order to clear up certain matters in my own mind. First, may I say with respect to the distinction between your department and similar departments in the provinces, I notice that at page 2 of your Summary and Recommendations you set out a really broad area for yourselves when you say:

...all matters relating to the promotion or preservation of the health, social security and social welfare of the people of Canada over which the Parliament of Canada has jurisdiction...

Would you, for the information of the committee, say what your department has responsibility for directly, aside from the things in respect to which you work in co-operation with the provinces?

Dr. Willard: Well, for example, all of the scientific activity relating to the food and drug administration, and all matters coming in relation to drugs and patent medicines, and so forth. These are specific pieces of legislation that come within federal jurisdiction. There are examples on the health side.

In addition to that the federal Government carries on research activities that are of a general nature, and are of value to Canada as a whole, and do not necessarily touch any problems relating to federal and provincial relationships.

For example, under the National Welfare Grants Program, or the research program under the Fitness and Amateur Sports Program, we draw a research committee from outstanding research and scientific people in Canada to serve on each of these research advisory committees. The projects that are received will come from universities and from various social agencies—national, provincial, and local—and they are considered by these research committees. If they are considered suitable for support, and if they reach a priority level within the amount of funds available, the funds are granted. If there is any possibility of conflict with research activities within a province an effort is made to try and let them know what we are doing. But, generally speaking, the amount of research going on in some of these fields is quite limited and, therefore, we tend to be in a leadership position, and the question of jurisdictional problems has not been a serious one.

Now, I think in the case of the public health research grants the funds were initially allocated on a provincial basis, and then by agreement with the provinces they were put back into one fund, and I think the projects go through the provincial departments. We have a process whereby in the welfare grants we let the provincial department know what kind of research project is coming through from the provinces, so that we will avoid the possibility of giving support to something that they may feel has no priority, or that they may have turned down, or in respect to which there may be some reason that the person submitting the project would not reveal. This kind of liaison can clear up such matters.

Senator Thompson: How do you decide on priority? Let us take health, for example, and priorities of research into diseases. Who in the department decides this, and upon what background information does he make that decision?

Dr. Willard: Dr. Bundock may wish to supplement what I say here, but we have supported a lot of research in the mental health field through the mental health grant, so that it tended to go in that area. Items in public

health research, which covers a broad spectrum, get referred to the Public Health Research Committee, and this committee has liaison with other research committees in the federal Government—for instance, the Defence Research Board, the Department of Veterans Affairs, and the Medical Research Council—so that they make sure the project gets into the right slot. If it is fundamental research it might go to the Medical Research Council. If it is, say, applied research in the public health field it would get over to our place, but most of the people would know where to direct their projects. Sometimes there are marginal projects, and when there are marginal projects there can be some swapping, but this avoids duplication and tends to let people applying for research know that they applied at the right place and that there is this kind of liaison there. I do not know whether this answers your question.

Senator Thompson: I was wondering if your decision to give priority to research is based on the prevalence of some chronic diseases in Canada. Is it based on the needs of the Canadian health picture?

Dr. Willard: If you look at volume 1 of the main brief, page 377, you will see the main causes of disability in Canada. The committee working on this took it, I believe, as their guideline and tried to address themselves to some of these particular diseases and disabilities and indicate the extent to which support is being given.

I think, if you read through the report you will get a rather varied picture of the nature of the departmental support of some of these, because in some cases the non-government sector carries a very large load—in cancer, for example, we have the Cancer Institute—in some the provincial development is very considerable, so that in many cases the federal participation is, I suppose, like a balance wheel, it tends to flow into some areas that are not being adequately looked after. I suppose in many cases you could go through this and say that there perhaps should have been a different type of priority, but I think in many instances this has developed in relation to what the provinces are doing, what the non-government sector is doing and how different things have developed almost within the federal department.

The Chairman: But you adopt a kind of passive attitude in this. You receive applications; you do not tell people, "You do that

kind of research and we will give you a grant" within your extra-mural program. This is what you are getting at, Senator Thompson?

Senator Thompson: Yes.

Dr. Willard: I wonder if Dr. Murphy would want to comment on that as it affects his program, and perhaps Mr. Iverson could comment as it affects the welfare grants program.

Dr. J. B. Murphy, Section Head and Consultant, Research Development Section, Department of National Health and Welfare: Could I have the question again please?

The Chairman: The question is how you approach your assistance in these areas of health. Do you ask people outside to do some research in a specific field or do you wait to receive applications and then approve or refuse them?

Dr. Murphy: May I just make one more qualification? Do you mean over the years, or within the last year, or what?

Senator Thompson: I mean what your practice is.

Senator Leonard: What are you doing now?

Dr. Murphy: We have done both. That is we have encouraged people to do specific research jobs for us and we have received applications from the field which we knew nothing about until we received them. These were applications from individuals to do some research in the public health area. At the present time we are receiving application from the field predominantly; that is to say we have little of the development part of the research.

Senator Thompson: My question originally was: is your research based on the prevailing needs of Canadians in the health field? notice on page 33 of this summary you refer to the fact that you do not have reliable estimates in Canada of the prevalence of chronic diseases and disabilities:

...in view of our inadequate information of the economics of health care in Canada and in view of the fact that the findings of the 1950-51 Canada's Sickness Survey are still being projected for a vastly changed population, we recommend the establishment of an ongoing Canadian Health Survey.

In view of not having these figures I wonder how you can set priorities on prevailing illnesses.

Dr. Willard: Mr. Chairman, if I may answer that, the 1950-51 survey was a very large undertaking and we have been able to use it to make estimates to project through the years, which I think they are fairly reliable. All we are saying is that the time has come when we ought to really update it and take another look at this. We might not follow the same kind of survey that was carried out in 1950-51, but there may now be other techniques we might wish to follow or use. I think this is the kind of thing that the department, in consultation with the Dominion Bureau of Statistics, probably should be thinking about, but it does involve a substantial outlay of funds. We would be quite a long distance from it if we do not soon start to have another one.

Senator Thompson: Instead of waiting until the 1971 census, could you not be doing sample research? I understood someone had asked your department about mental retardation and how prevalent it is, and they were told you have no figures on this. I am thinking of examples like this where you have a lack of knowledge, and therefore I question now you establish priorities on the basis of prevalence.

Dr. Willard: Dr. Josie, do you want to comment?

Dr. Gordon Josie, Assistant Director-General, Food and Drugs, Department of Health and Welfare: I think it might be worthwhile to remind you that when the national health grants program was introduced certain disease areas were identified, particularly cancer, mental health, tuberculosis and venereal disease, for special grants, and these grants included funds for research. They have subsequently been consolidated into the one public health research grant.

The point I make is that these particular disease areas were then identified as areas specially needing attention, and the criteria I believe included information then available about prevalence and about our consciousness of the extent of services then available for dealing with them. To some extent those priorities still apply, and it is true that the department considers information such as that represented in the table to which your attention has already been drawn, plus of course the standard vital statistics and the

cause of death, to which we are now able to add hospital figures and morbidity figures. So we do have a good idea of the relative frequencies of the different disease entities and they do to some extent affect our allocation of funds for research extramural, but that is only very roughly so, because in general the funds are made available with only very general directions about the areas in which we are interested in supporting research. This is partly because there is first a provincial basis for the allocation of the grants that is not a financial basis but to go through the provinces with a view to having the need expressed in terms of local (a) need and (b) capabilities for research. And I think the latter aspect is a particularly important one in deciding.

There is a whole series of special committees dealing with the allocation of grants and approval of particular projects and there is a general co-ordinating committee which is set up by the Dominion Council of Health and that has an opportunity to weigh and to allocate the public health research grants total funds according to priorities as that group sees fit, and it is a representative group, representative of different expertise development, special committees, plus representatives of the different health interests so that priorities in terms of disease entities are expressed but not rigorously and the planning within the Department is in these general terms.

Senator Thompson: Thank you very much.

Dr. Willard: I wonder if Dr. Josie would mention about the problems of retarded children.

Dr. Josie: I think that, Mr. Chairman, the problem was so self-evident virtually in all the needs of these areas that the Department set up a conference for this special area, partly to obtain more information but more particularly recognizing the problem, recognizing the complexity of it, what is to be done and who ought to do it. Many of the areas that are of importance in that way can be dealt with without the precise information as long as you are conscious of the existence of the problem and in some cases you need only pretty rough indicators.

The Chairman: On this specific problem of mental retardation why do you need two programs, two systems of grants, one for health and one for welfare?

Dr. Willard: The Government made a decision to make \$5 million available for mental retardation projects and it was just a case of where we will get the funds to do it, so that we are taking some of the funds for health oriented projects out of the health grants and we are taking welfare oriented projects out of the welfare grants; but the people on the health side and those on the welfare side work together on these projects when they come in, so this is just a matter of—I do not know whether Dr. Iverson might just say a few words on that.

Dr. Brian J. Iverson, Director, National Welfare Grants Division, National Health and Welfare: Mr. Chairman, perhaps first I might correct the record. I think it is \$2.5 million for the mental retardation grant.

Dr. Willard: Yes, \$2.5 million, that is right.

Dr. Iverson: To come back to earlier questions, I think that Dr. Chapman's remarks suffice about the broad dimensions for action being taken, when it can be observed that it happens in this particular instance under the welfare side of the mental retardation grant. We are supporting a study which will attempt to revise the technique for more precise measurement and so give precision to this particular problem.

I think Dr. Willard has answered the broad question. In order to ensure that there would be a balanced attention given to that aspect, the health aspects of the mental retardation problem, a decision was made to administer under the terms of the two programs.

The essential administrative advice has been noted and there has been a high degree of collaboration which exists in the consideration of the projects working at the administrative level.

Senator Thompson: Could you break down the proportion of people who work on regulatory basis? I am thinking of professional staff for regulatory work, as against those who do basic research, all basic research, I am not just thinking of basic research.

Dr. Bundock (Principal Medical Officer, Special Projects, National Health and Welfare): We have 2,000 Ph. D. researchers who are doing research. This would compare with the total number of the permanent staff which is 7,500 and that will give you an indication of the ratio of scientists there.

The Chairman: Let us take a specific example, for instance, in the Food and Drugs Directorate. This is in so far as your intramural expenditures on research, this is the big chunk, about half, about 50 per cent of your intramural activities. I suppose most of the research which is being done there is to check with various drugs and all this?

Dr. Willard: Dr. Chapman may say a word?

Dr. R. A. Chapman (Director-General, Food and Drugs Directorate, National Health and Welfare): Mr. Chairman, honourable senators, the division, as far as manpower is concerned, is approximately 450 personnel involved in the bureau of operations, which is the regulatory arm of the Food and Drugs Directorate, as compared to a little over 200 personnel in the research laboratories which is the main arm carrying out the research in the directorate.

The Chairman: But they are doing the research, their research activities are closely related to the regulatory responsibilities of the division?

Dr. Chapman: This is the structure, Mr. Chairman. All of the research is mission-oriented, that is, it is directed towards solving problems that must be solved in order that we can meet our responsibilities under the statutes—the Food and Drugs Act, the Proprietary or Patent Medicines Act, and the Narcotic Control Act.

Senator Thompson: I am a layman in all this but it seems to me that research persons, men thinking of basic research alone, would feel somewhat cramped if tied in with regulatory functions. It is a limiting factor, to be just going out on a regulatory basis. That seems to be a different type of person who feels at home with that, than a researcher. Would you agree with me? I just wonder about the people who go into your department with the desire to do research and who find out that what they are doing is taking samples to a large extent, or seeing that the laws are regulated correctly—and therefore they would avoid going in to the department.

Dr. Willard: Dr. Chapman may be able to give some illustrations of rather interesting projects. They flow from our regulatory function, but the research actually is very stimulating and interesting.

Dr. Chapman: I am looking at the definitions given in report No. 4 of the Science

Council of Canada, "Towards a National Science Policy for Canada", page 7 in which "applied research", which is the type of research we are carrying out in the Food and Drugs Directorate, is described as "the search for new knowledge to provide a solution to a specific problem which is defined at the outset of the research program; it does not differ radically from basic research in methods of scope, but in motivation." We feel that this applied type of research provides splendid scope for the research scientist. However, in this type of research you do run into a certain proportion of research—probably somewhere in the order of 8 to 10 per cent—which could be considered as basic research. Our research is of a sufficiently high calibre that we can attract the top scientists in the fields in which we are working.

The Chairman: Surely most of your research activities in this field are more or less imposed on you or on your people by the community or, let us say, by the drug industry people. They come to you and apply for a licence to produce a drug and then you do research to know if the effects of that drug will be salutary, and so on.

Dr. Chapman: Yes.

The Chairman: Most of your activities must be in that field, I assume, or do you have a lot of research programs of your own, irrespective of the demands that your regular function imposes on you.

Dr. Chapman: No, Mr. Chairman. They are all related to the problems that we must solve in order to carry out our responsibilities. But in this area it is so broad and the food and drug and cosmetic and medical device area has become so complex that there is just no lack of challenge in this area to research scientists.

On page 128 of volume II you will find just a very brief reference—in fact, just titles—to a number of the research projects that are under way at the present time. We have approximately 100 research projects which are being conducted at the moment. You will notice that they cover a very broad range.

In the food division, for example, we are working on everything from the chemical composition of fruit juices to organophosphorus pesticides; from a biological assay of toxic residues in food materials to the characterization of toxic compounds of fungal origin and their analysis in foodstuffs, and methods of analysis for food colours.

In the microbiology division we have a similar range of projects as well. Actually, there are five divisions of research: the food division, the microbiology division, the nutrition research division, the pharmaceutical chemistry division and the pharmacology division.

We find in each of these areas a very broad range of research projects, all of them mission oriented.

Senator Thompson: Mr. Chairman, I did not get a feeling of excitement in reading the material in connection with these various research projects. Just looking at page 14 of the summary, you say in respect of the case studies that you did:

We have not chosen these necessarily as the best examples. Instead they are representative,...

What I would like to know, because of the respect we have for health and welfare, is what your best projects are, such that we would be almost on the brink of getting Nobel prize winners in health and welfare. Can you give us some examples to excite us in this area, where, if you just had perhaps more funds or something like that, we would be getting a great new discovery?

Dr. Willard: Mr. Chairman, some of them get the headlines, such as the cobalt-beer case. I do not know whether Dr. Chapman wishes to say anything about that, but that was a very fundamental problem that suddenly came up. It was headline material. How did they react? Perhaps Dr. Chapman could say something on that.

Dr. Chapman: This is just one of the problems that we have faced. It was an urgent problem and involved the presence of cobalt in beer at a level of approximately one part per million. It was necessary for us to find out very quickly what was causing this condition in the Quebec City area and whether or not cobalt was actually involved.

Without going into the details of the experiments, which involved quite a number of our personnel because they had to be put onto this particular project immediately, we found that there appeared to be three factors involved: a poor state of nutrition, a virus infection and stress caused by cobalt from the consumption of excessive amounts of beer. The very poor state of nutrition in the individuals who were suffering these particular heart lesions was complicated by the addi-

tional factor of the stress that was put upon the particular person when he consumed excessive amounts of beer. The amount of beer went up as high as 50 pints per day on a continuous basis.

Senator Grosart: That is exciting.

Dr. Chapman: There is still some unexplained factor, because it was associated with a specific area where there may possibly have been a virus infection of a particular type occurring in that area.

We had to go into the biochemical aspects of this problem. We were able to reproduce these lesions in experimental animals under specialized conditions where we stressed the animals in a particular way. We were using rats for this purpose. We put them on a low protein diet and then gave them excessive amounts of cobalt—much higher amounts of cobalt than the humans were consuming. By this method we were able to reproduce the same type of lesions. This is quite an exciting thing.

Senator Thompson: Perhaps this question would be of importance to numbers of Canadians because it has to do with the drinking of beer, but there is another field that interests me, however, and that is mental illness. One out of seven Canadians are supposedly suffering some kind of mental breakdown. Are we making any breakthrough in that area?

Dr. Josie: Mr. Chairman, perhaps I should not reply to that because I am apt to say, "No." The department itself is doing no direct research in the field of mental health. It is, however, under the health grants program, supporting both development of services and some research projects. As to whether or not there are breakthroughs I think about all one can say is that there are hopes of some people who know about certain conditions, particular neuroses, that can be improved by the removal of stress conditions. And I am not talking about the rats now, but certain situations may be helpful in preventing the occurrence of neuroses. However, the major psychoses are still of unknown etiology.

Senator Grosart: Mr. Chairman, I wonder if I may ask a specific supplementary question here? When reading the brief I got the impression that anything affecting the health of Canadians would be of intense interest to the department and that we could expect action. I was also catching up on *Hansard* in

my weekend reading and I came across something that disturbed me. It was a question asked in the House of Commons of the Department of National Health and Welfare. The question was:

Has the Department of National Health and Welfare refused a request to analyse in its laboratories various abortion pills feared dangerous?

The reply of the Minister was:

The Department of National Health and Welfare receives each year a number of requests from individuals asking that an analysis be carried out on a specific product. Since no action can be taken on the results of such analysis, the individuals are informed that the Department of National Health and Welfare is not in a position to perform such a service. However, if there appears to have been a violation of the Food and Drugs Act or regulations, an investigation is initiated and any official samples obtained during such investigations are, of course, analyzed in departmental laboratories.

In February, 1968, the president of the Association for the 'Modernization of Canadian Abortion Laws, wrote to the Department of National Health and Welfare indicating that she had in her possession three types of pills 'which are being given to women in the Ottawa-Hull area in conjunction with certain injections to induce abortions.' The association requested that the pills be analyzed.

On the basis of all the information available, there did not appear to be any violation of the Food and Drugs Act or regulations.

Accordingly, no analysis of these pills were carried out in the laboratory of the food and drug directorate.

Now it seems amazing to me that that should be the case.

The Chairman: You want to know who prepared the answer?

Senator Grosart: No, it is the Minister's answer and I always believe the Minister gives his own answer. I am amazed to find not so much that this particular request might be refused for technical reasons, which I could understand, but by the apparent brushing off of the legitimate request for an analysis by the department in a fashion as cavalier as this. What is the theory? Is this theory correct that if somebody asks for an analysis, the department says, "We cannot take any

action; we do not think it is a violation of the Food and Drugs Act; and therefore we will do nothing." Is that the attitude of the department?

Dr. Willard: I do not believe I should comment any further than that report. I think it is quite self-evident what is available and what is not.

Senator Grosart: Well I am saying it is not at all self-evident to me.

Dr. Willard: The kinds of analysis carried out flow from certain types of legislation. Dr. Chapman works under that legislation and he could indicate, if he so wishes, the kind of thing they can and cannot do under the legislation he works under.

Dr. Chapman: If I may, Mr. Chairman, I would like to add something to that. It certainly is not the case that we have any intention of brushing off these requests. The point is that we do get, as the Minister indicated, a number of requests and these range widely. There may be a single tablet or small amount of powder submitted to us with a request that we analyse it. We have no information whatever about the history of this particular tablet or this crystalline substance that has been submitted to us. Now if we can go out, however, or if we can send one of our inspectors out to pick up the sample so that it becomes an official sample and take it back to our laboratories, then we are in a position to follow through and take action under the appropriate statute, if there is any violation of a particular statute. But it is the fact that we could simply do nothing with the results obtained in this instance and that would seem to make it rather futile to carry out this analysis. It is not because we were being cavalier.

Senator Grosart: Well, I do not understand that at all. If a citizen asks for an analysis from a department spending \$1 billion in R and D, it seems to be incomprehensible that the request should be treated in this fashion.

The Chairman: Surely not \$1 billion.

Senator Grosart: Sorry, \$1 million.

Senator Leonard: But this is not a general research department. It is a department concerned with the sale of food and drugs.

Senator Grosart: But the department as a whole is concerned with much more than that. I am not saying this was addressed to

this particular section. It was addressed to the whole of your department and the department was asked by a citizen to make an analysis of a pill which appeared—and I presume this was submitted by a responsible person who appeared to be the head of an association concerned with a very vital problem—a pill that appeared to be dangerous, and the department in effect said, "We cannot look at it." Even if it were not possible to take action, I would suggest that the citizen could at least have been written to and told, "Yes, we will analyse it if you are concerned." I would like to think that if I brought something into the department and said, "I have reason to believe that this is killing people, will you analyse it?" that something would be done about it. In this case, taking your answer, Dr. Chapman, I do not understand why they did not say, "We will pick up some and have them analysed." This lady says she has them in her possession and she knows they are being sold in the Ottawa-Hull area. I do not intend to be critical, but here we have a situation that the department is telling us of all the things they do and all their concern and interest, but here we have a specific request where somebody says, "This may be killing people" and then you say, "Sorry, we cannot do anything about it."

Dr. Chapman: Mr. Chairman, if I may, these tablets were in the possession of Mrs. Perron, as the answer suggests. She had tablets of different colours. She could not give us any more information because the pills, according to her, had been given by certain persons to young women who were pregnant and wished to bring about an abortion. She could not give us the names of these young women because they might be in violation of the Criminal Code. She could not give us the names of the individuals who had supplied the pills to the young women because apparently the young women would not give this information. This was a matter for the police and so we suggested to Mrs. Perron that she should go to the police, which was the appropriate agency, at whatever level was appropriate, either the RCMP or the local police, and we would be prepared to co-operate in any way possible in analysing the tablets obtained from these sources. But simply to analyse the tablet and tell Mrs. Perron that this particular pill may contain quinine—what useful purpose would that serve?

Senator Grosart: It serves the useful purpose of answering your request from a citizen

who was very much concerned, and that is a damn useful purpose in a democracy.

Dr. Chapman: Mr. Chairman, the question is what would Mrs. Perron do with the information.

Senator Grosart: It does not matter what she would do. She is a concerned individual going to her own Department of Health and asking you to help her.

The Chairman: She was not using the pill.

Senator Robichaud: She was not prepared to give any information either.

Senator Grosart: It seems to me whether she was prepared to do so or not, if this is as dangerous a substance as it appears to be on the surface, the department should say, whether she is prepared to give information or not, "We will look into this." However, Dr. Chapman, I am much more satisfied with the explanation you have given than what appears here. Nevertheless, for a department exercising the responsibility that you exercise, to say to this woman, "You have got to go to the police" does not seem to me to be an adequate way of handling the problem. Senator Thompson was asking here about initiative in research. However, I do not want to press this beyond saying that more consideration should be given to a request brought to you by a concerned individual.

Dr. Chapman: Mr. Chairman, if I may make one more comment, it is recognized that there are legitimate drugs on the market that have been recommended from time to time as abortifacients. That is, drugs which it has been suggested will bring about an abortion. We assume and, as a matter of fact, Mrs. Perron indicated to us, these pills contain quinine, in one case, and estrogens in another. These are perfectly legitimate drugs sold on the market and are very useful products. She was able to obtain this information.

Senator Grosart: I understand you are saying this is what Mrs. Perron told you, but you did not analyze them and do not know whether this is so or not?

Dr. Chapman: No, we did not analyze them.

Senator Grosart: Then I will not pursue it.

The Chairman: We could come back to Senator Thompson in a moment.

Senator Kinnear: I would like to ask about the research you are doing. In the magazine *Health* of June, 1968, at page 14 it states:

CHRONIC LUNG DISEASE

One of our most urgent health problems is the alarming increase in lung cancer and chronic obstructive lung disease—bronchitis, emphysema, and asthma. Chronic lung disease as a cause of death in white men over age 45 is increasing more rapidly than any other illness. It is second only to cardiovascular disease as a major cause of disability in men.

And, I might say, a great many women have lung cancer also.

There is impelling evidence, of course, that personal air pollution, in the form of cigarette smoking, accounts for the major part of the striking increase. But the question is asked frequently whether atmospheric pollution is also significant in the development of these serious lung diseases.

I would like you to comment on what you are doing in research, particularly with regard to lung cancer and cardiovascular disease. You kept it to the one area in your earlier remarks, and these seem to be the two major causes of death resulting from these diseases. What research are you doing in these areas?

Dr. Bundock: I would suggest that Dr. Josie may wish to comment on this.

Dr. Josie: Mr. Chairman, Senator Kinnear, there are two aspects to this problem, and with respect to lung cancer itself the best thing that we can do is to carry on, as we are doing, a health education program discouraging people from starting smoking and encouraging those who do smoke to stop smoking. That is a preventive measure.

The other thing we are doing is putting a little money into research into ways of improving that educational program. That is a very oblique approach, but with respect to lung cancer, I think this is the most effective approach, because there are considered to be very few causes of lung cancer mortality other than smoking.

In respect to the relationship between air pollution and smoking and lung cancer, the studies that have been done indicate that although air pollution may be a factor it is

not nearly as significant as is the factor of smoking. That is to say, if you study the occurrence of lung cancer in people in the rural areas, where there is relatively little air pollution, you will find there is still the differential between the smokers and non-smokers in lung cancer mortality, and you will find relatively few lung cancer deaths among non-smokers in any environment, polluted or otherwise.

There is, however, considered to be a pollution factor of some consequence. The department itself is not directly doing work in that area, and I am not sure whether at the moment we have any public health research grants on it. Dr. Murphy can speak to that. If there are any, he can tell you of them.

The other point I would like to make, since you raised the question of this kind of investigation, is that most of the clinical research in the medical field is supported through grants through the Medical Research Council rather than public health research grants, for obvious reasons.

Could Dr. Murphy comment, Mr. Chairman?

The Chairman: Yes, Dr. Murphy?

Dr. Murphy: Mr. Chairman, honourable senators, Senator Kinnear: May I cover cardiovascular disease before I come back to the lung?

Up until two years ago we had a research subcommittee which dealt with all projects on cardiovascular research. This would be research of a public health type on either the heart or the arteries or both. During the last two years we have not had too many of these projects come into us from the field. We have had a number, but they have been better situated in other research subcommittees—that is to say, epidemiological research subcommittees, or maternal and child health subcommittees.

So, in the last two years we have been placing these research projects in cardiology or the cardiovascular system into these other subcommittees. We have a list of experts in Canada to whom we will field these research projects for expert appraisals. Depending on the nature of these appraisals, they will then come back to the appropriate subcommittee for final review and recommendation to be funded or not to be funded. That is cardiovascular.

To return to the problems of lung disease, I would like to mention to you that we do have, and have supported for a number of years, a certain number of projects on air pollution. In this current fiscal year the number of projects we supported in this field was five. I could go into detail on what was done or what was proposed to be done, if you wish.

Senator Kinnear: No, I know you have been going into it from the smoking angle, but I have personal knowledge of deaths from lung cancer where the patient did not smoke, but I felt there was a great deal of air pollution where they lived. It makes me wonder, because they are laying emphasis on smoking, and I suppose that is probably the cause of the greatest percentage of the trouble, but certainly there is another factor somewhere.

Dr. Murphy: Air pollution is indicated as a causal factor in lung cancer. As Dr. Josie mentioned, there is less of it in the country than in the cities. The factor in the cities that seems not to exist in the country is this factor of air pollution.

Senator Thompson: Could I ask a supplementary question on this? I have noticed in the *New York Times* of September 12, 1968 the heading:

LUNG DISEASE LINKED TO SULPHUR DIOXIDE and it describes how a group of doctors at the Chicago Health Research Foundation have been studying more than 500 people with chronic bronchitis and other "significant pulmonary disease." I have some clippings here which refer to this. There is one on asbestosis, and it says that Dr. Benjamin Felson of the University of Cincinnati says that there is a high incidence of lung disease because of this.

I am sure you are aware of these matters. How do they relate to such research work as you are doing? Where do you pick up on these? When you hear of a breakthrough in connection with air pollution and sulphur dioxide, what happens?

Dr. Murphy: Not really anything, sir.

Senator Thompson: Suppose you are engaged in a project on air pollution and you realize that there is a breakthrough in the States. Do you stop the project?

Dr. Murphy: No, but during my field visits, when I discuss the research that is being done with the investigators themselves, I would bring this kind of finding to their

attention, and I would tell them that we would certainly entertain a research project along these lines from them in the following year, if they feel there is some merit in so doing. Depending again on our departmental policies, and what we might wish to pursue in the way of stimulating research, I would be at liberty under such policies, and in the face of new evidence like this coming up, to actually go out and ask the investigator if he would get into this area because we did feel it was important.

Senator Thompson: Suppose we find asbestosis is taking place in men who are working in an asbestos mine. Surely, you would then move in and suggest there should be certain regulations regarding fencing off certain areas in those mines—and similarly with sulphur dioxide? You would not just tabulate that information?

Dr. Murphy: No, and certainly in respect of the asbestosis problem we have moved in already. We have been involved in it for a number of years through our Division of Industrial Hygiene. But, may I say a word about sulphur dioxide, which is a little different?

In this country we have not had a really bad occurrence of sulphur dioxide intoxication through the occurrence of a fog or smog. There have been some very bad instances occurring in France, and they are occurring quite frequently in the United Kingdom in addition to the really bad ones that occur there, and they are occurring in Los Angeles, California, and other cities of the United States. In these places a very, very heavy smog can suddenly form because of certain atmospheric conditions.

Now, it is not the sulphur dioxide that is the trouble. When you inhale sulphur dioxide, which is a gas, it combines with water to form sulphuric acid, H_2SO_4 , and this is what causes the problem, because it is corrosive to lung tissue.

During my early years in the laboratory I was experimenting with sulphur dioxide gas because I was interested in air pollution. I had colonies of rats which I could expose to this material. All one needed was a little moisture in the air, and one could produce lesions in the rats' lungs which were identical to those produced in human lungs during these serious occurrences of smog.

Now, these are natural phenomena, and we have not really got the engineering know-how

to prevent these smogs occurring. So, it is a little different problem in a way from that encountered in the asbestos mines, where you do have a little more control. I hope that that clarifies the thing a bit more.

Senator Grosart: Mr. Chairman, I have a few questions that relate to matters scattered through the report. I can assure our witnesses that they will be easier than the last one.

First of all, for the record, Mr. Chairman, I think we should thank the authors of the brief for the kind things they have said about this committee, and particularly for saying in the summary:

Thus, we have entered into a phase of symbiosis between the scientist and the legislator, through the sharing of public concern.

The authors of the brief indicate that we have had something to do with that symbiosis. My Greek is a long way back, but I think "symbiosis" has the sense of living together, has it not?

At page 326 of Volume I, about three-quarters of the way down, there is a statement speaking of co-ordination of scientific activity generally. The statement is:

There is no authority requiring co-ordination of efforts, delineation of responsibilities in granting policies in the field of medical research.

That is a matter which has come up before the committee before, and I put my question to you in this way: Do you think there should be some overall co-ordinating body to assess all proposed medical grants? I would go beyond that and say "all grants", but the reference here is to "medical grants". Are you suggesting it would be helpful if there was a co-ordinating body?

Dr. Bundock: Mr. Chairman, I believe that in recent months there has been a change in the structure of the research pattern in the medical field, and I refer specifically to the transfer of the Medical Research Council from its former association with NRC to its coming under our minister for purposes of reporting to Parliament. You are probably aware that at the moment the MRC is a department of Government under the Financial Administration Act, and it reports to Parliament through our minister. The minister by virtue of his office has assumed general co-ordination of the two programs—the medical research program and our own several

programs of research, because we are operating certain programs in the health and welfare field.

The minister has assumed the overall co-ordination, and at this time he has set up the machinery to have established a co-ordinating body. This at the moment is being done.

I might perhaps mention, Mr. Chairman, that while we were writing this report, Report No. 4 of the Science Council of Canada was issued, and you may have had a chance of seeing that the Science Council is proposing to the cabinet an approach that is a way of co-ordinating what is described as a major problem across the board. In this instance, if the Medical Research Council is operating a major program that would probably fall within this general policy of major program administration, perhaps I can explain how it is expected to work out.

The Science Council would undertake the responsibility of assessing these major programs, and where more than one department may be involved in a related field—and in this instance it would be the Medical Research Council and some of our research programs—the basic principle as we understand it—and this has been endorsed by the department, as reported in our brief, and the department finds it practical—is that they would undertake a systems analysis of these new major programs. Any new major program would be subjected to systems analysis, which is a practical approach that would allow a much closer assessment of the capability to manage a future program. We find this practical because more and more programs which are now being operated—and this applies to health and many other Government programs—are administered by several departments, and need to be administered by several departments, and take into account several disciplinary groups.

The trend seems to be to establish what in some places is called a task force, so the approach would be to have a major program that would have to be evaluated first by the Science Council, who would determine if it interests more than one department or agency of Government or Crown agency, who would have to assess the merit. You may have seen a report which lists a number of criteria that we also find very practical in trying to co-ordinate our own departmental research program. One example is water management. At the moment we are deeply involved in certain aspects of water research with the Depart-

ment of Energy Mines and Resources, which has assumed full management. We as a department contribute to certain water research aspects but the Department of Energy, Mines and Resources assumes full management of the whole research program.

We envisage such mechanisms for the Medical Research Council if it extends its activities, but at the moment our minister is in the process of setting up machinery to insure that the co-ordinating mechanisms are supplied so that at the various administrative levels—that is, the planning stage, the operating stage and the evaluating stage of the research—both agencies have programs which are most productive for the public interest.

Senator Grosart: As we are here dealing particularly with a national science policy, this would seem to be an essential component. Yesterday, for example, Dr. Solandt seemed to tell us that in this area there were by and large some bad groupings of grants, that they were not directed towards setting up centres of excellence in universities. I must say that as we look at the evidence coming before us there seems to have been very little co-ordination of R and D grants between departments. If this were not so we would not be faced with the statement by the Science Council that our whole balance of R and D expenditures is wrong today; it has grown up and become wrong because all over the place there were science policy decisions made apparently without co-ordination.

Senator Thompson: May I just intervene with a question on the Medical Research Council? How does your department, apart from at the ministerial level, relate to the Medical Research Council?

Dr. Bundock: It might be useful if I went into the history a little at this stage, otherwise it might be difficult to understand.

Senator Thompson: Is there someone from the Medical Research Council here?

The Chairman: No. They are responsible directly to the minister.

Dr. Bundock: Yes, that is so.

Senator Grosart: They are a sort of emanation of NRC.

Dr. Bundock: If I refer to the history it may bring this to a head. Initially when the Medical Research Council was established as a division of the National Research Council it

started with very little funds of its own. I am talking now of the early fifties. By that time our own department had started; it initiated a grants program in 1948 which made provision for substantial funds to be earmarked for research. However, at that time there was really no strict delineation of our research effort. Medical research was not wholly covered by any agency and we in our own departments were making grants for public health purposes, which also included medical research. Our effort was rather modest, but over the years, as you are aware, the Medical Research Council became a semi-autonomous body, as it is today, and now has authority to spend more funds. We are still in the process of gradually turning over segments of research from our own departmental administration to the Medical Research Council.

I should mention, as I believe Dr. Willard said earlier, there is in existence an inter-departmental committee that meets twice a year, composed of the four major granting agencies at the federal level, namely our own department, the Medical Research Council, the DVA and the Medical Research Board, although there is no statutory authority for their meeting.

The Chairman: What about NRC?

Dr. Bundock: As I indicated earlier, NRC and the Medical Research Council, which was for several years a division of the NRC, were very closely associated, and initially their programs were part and parcel for all practical purposes. There are several informal or, if you like, interdepartmental committees between NRC, our own department and other departments.

Perhaps I might return to the relationship between MRC and our own department. Over the years MRC has been gradually enlarging its field of operations. While it is still staying well within the medical research area—by which I mean the clinical field, the para-clinical field—the council is now certainly sponsoring and financing much wider areas of research in the medical research field. We are endeavouring to co-ordinate our efforts with the council in the hope of finding the best way of using the funds in our respective areas of statutory authority.

I might mention that in addition to the ministers there are these informal almost daily contacts between MRC and our own staff at the staff level of those operating our research division, who on receiving a project

make an informal call and ask whether MRC are dealing with it. Perhaps Dr. Murphy could give you more detailed information about this kind of day to day co-ordinating mechanism that is operated.

Dr. Murphy: Mr. Chairman and honourable senators, what Dr. Bundock says is true, an informal basis has been established between the National Health and Welfare and the Medical Research Council to trade projects. It is most desirable.

The Chairman: Before you go on, could you tell us if the National Research Council is offering grants in the field of medical research.

Dr. Murphy: No sir.

The Chairman: They only do intramural research on medical science?

Dr. Murphy: No sir, they do not do that either. May I comment further? The National Research Council is engaged in research both intramurally and in the funding of research extramurally. The kinds of research they are engaged in are researches in the physical sciences and in the biological sciences. One could, I suppose, by stretching the understanding of research in the biological sciences say they are possibly involved in some basic fundamental research in biology that might be of use to medicine at some future time, but you cannot really call it medical research as such right now. It is fairly fundamental, perhaps too fundamental to be called anything except fundamental biological research. They do intramural and support research in the field and have a fundamental research in biology. Since medicine is applied biology there is a connection, but I have never yet traded a project with the National Research Council, whereas I have traded many with the Medical Research Council, again only in an informal basis. This is the problem. It is most desirable to have a formal mechanism for the exchange of these projects.

Senator Grosart: I agree entirely. We have had this kind of evidence over and over again. Everyone says, "We have got all sorts of co-ordination. We have boards and advisory boards and we can talk to each other every day", but it comes back to the fact that co-ordination does not necessarily mean control, and that is what science policy must be concerned with.

Perhaps if I could add this paragraph. I know you must have seen this *Canadian*

Press report of last August. I will read one paragraph:

The Cabinet decision to shift the Medical Research Council into the federal health department from a virtually autonomous position as an agent of Parliament is causing serious worry in the scientific community.

It goes on to say what the worries are. I just leave it with you. I do not know if it needs comment or not, except that it is causing serious worry in the scientific community. Has the whole Medical Research Council been shifted into your department?

Dr. Bundock: The situation as it stands now is that the Medical Research Council is a special department of the Government for the purposes of the Financial Administration Act, which means it is operating independent of the Government but reporting, as I indicated earlier, through our minister, and our minister has already taken several steps, since he has responsibility for insuring broad co-ordination between the work of the two agencies. He has to make sure that there is co-ordination at the various levels of the administrative process concerned with the work of these two agencies which are responsible for him.

Senator Grosart: So you would say it is an exaggeration to say, as this report does, that the whole Medical Research Council has been shifted into your department?

Dr. Bundock: I do not think I have enough data to give the full information.

The Chairman: They have acquired greater autonomy and they are reporting to another minister.

Senator Grosart: I go on to page 334 on the pollution problem, where I read: "The Department is expected to provide leadership to, and co-ordination with, the provinces and industry in the establishment of standards and guides." We were asking the Atomic Energy Control Board if they had standards and guides, and particularly if the standards of the international agency applied to Canada. The impression I got was that they do not. Have you standards in this whole field of irradiation? Are there promulgated standards with authority to enforce them.

Dr. Josie: I think not. I think that some of these rather specific areas are such that it might be advisable for us to have the individuals responsible here. In this particular case, the Atomic Energy Control Board has regulations respecting health and safety. Our department advises the Atomic Energy Control Board in the administration of these regulations. The regulations could be regarded as standard but I am not sure that that is exactly the way you are using the term.

The Chairman: Your department has nothing to do with the preparing of the regulations?

Dr. Bundock: Yes, it has, Mr. Chairman.

Senator Grosart: The quotation says "The Department is expected to assume leadership in getting these standards established."

Dr. Bundock: Senator Grosart, perhaps you would look at page 60, Volume 1, the section on standards. Taking a broad look at this page, on our radiation division, you will see it is involved with various departments of Government and with other agencies which have nothing to do with control of radiation. You see it involves both the federal departments and the provincial agencies.

As far as standards are concerned, you see at the bottom that there is the Emergency Measures Organization, the Defence Research Board, the National Research Council, who are involved, and you have a series of other committees which are related to the Atomic Energy Control Act and the regulations under it. You have the Reactor Safety Advisory Committee and also our Radiation Division is associated with it. You have the Accelerator Safety Advisory Committee also. These are some of the Committees with which our Radiation Protection Division is associated. It is providing to those committees some of the standards in the field of health related to health over the years. They represent a substantial amount of standards that they have evolved over the years as the senior advisory board in the health field to those particular five agencies I have listed now. These are only five, but speaking again of standards, if you look at the Department of Transport and all these seven agencies, the radiation protection division has been involved in advising either on standards or methods or operational aspects with these seven agencies.

Senator Thompson: Under the Department of Transport, for example, it just covers aviation, rail and water. So far as by road is concerned you have no regulations. At least this is what we learned from the Atomic Energy Board.

Dr. Bundock: That is correct.

Senator Thompson: I suppose you look on this as a serious gap.

Senator Grosart: On page 60 of volume I the word "standards" appears twice in the left-hand column headed, "Liaison with other Federal Departments and Agencies." Under No. 4, "Department of Mines and Technical Surveys", we have a reference to that department as it was then called, I suppose, and it says, "Training of Industrial Radiographers to Meet Canadian Government Specification Board Standard". Does the Canadian Government Specification Board Standard offer protection?

Dr. Bundock: This is so.

Senator Grosart: Then we have the National Research Council under No. 7, "Primary Radiation and Radioactivity Standards".

Dr. Bundock: This is another example, sir.

Senator Grosart: Who is responsible if we have a tragedy in this area?

Dr. Bundock: Well, I think, Mr. Chairman, that this is a statutory responsibility. With the information we have, I would imagine that the Atomic Energy Control Board has a primary role to perform in more or less regulating and seeing that these areas of Government are properly safeguarded.

Senator Grosart: They told us that they had three inspectors for the whole of Canada.

Dr. Bundock: Besides that, sir, I believe, and this is only my interpretation, that the agency itself which is operating has a responsibility to see that the statute and regulations are properly administered. Every company, for example, has to see that our regulations on water and on the use of public transport are properly administered by the company. We administer regulations but the agencies that provide the public services have the responsibility to see that arrangements are made

to see that these acts and amendments are properly administered. We have some responsibility in advising, but in the administration of the regulations I would believe that they may primarily rest with the Atomic Energy Control Board as the general agency responsibility.

So far as the operational aspect is concerned, the public agency that is providing the transport and other means, would have also a responsibility. I do not think there has been any case to our knowledge in jurisprudence that would indicate any definite finding in this regard, Mr. Chairman.

Senator Grosart: On page 336 we have a statement which does not make it any clearer to me—not that I am criticizing it on that account. I am just not able to take in all of this information. The statement reads:

At present, the Public Health Engineering and the Radiation Protection Divisions monitor marine life and water supplies for health hazards. The Food and Drug Directorate monitors food for the presence of pesticides. The Occupational Health Division monitors industrial activity for the control of industrial effluents through selected studies.

These people are monitoring. What do they do with what they monitor?

Dr. Bundock: Perhaps Dr. Josie would be more qualified to answer that question.

Senator Grosart: I am looking desperately in this brief and elsewhere for the word "control". I want to see where somebody says he is going to control this, particularly where we have health hazards. I know that there are problems of jurisdiction, departmental jurisdiction, political jurisdiction and so on. But it does not seem to me that this should stop us from coming up somewhere in some brief with the expression: "We will control this", or "we are controlling this", or "we intend to control this".

Dr. Josie: I would just add one comment.

Dr. Murphy: Would you like to deal with it? I would just add one general comment. With the exception of the Food and Drugs legislation including the Narcotic Control Act, we have very little control regulations. Most of our activities in the other branches, particularly the health services branch, are carried out under the general terms of the

Department of National Health and Welfare Act. That is stated here. We are to co-operate with the provinces in the promotion of measures dealing with health all over Canada. Now in the particular area of radiation protection there is control in the regulations under the Atomic Control Act relating specifically to the nuclear hazard. Now when you speak of monitoring particular sites, that information is given. In fact all radiation information, particularly fall-out information of which so much was heard last year—this kind of information is used in collaboration with nuclear facilities—the reactors. But on your general question as to control powers and legislation, I think I would defer to Dr. Chapman.

Dr. Chapman: Mr. Chairman, in regard to the Food and Drugs Directorate monitoring food for the presence of pesticides, if food contains the presence of pesticide to a degree greater than the accepted tolerance, or in a case where the tolerance is not known, if it reaches what is considered an unsafe level we take immediate action to remove that food from the market and we have full authority under the Food and Drugs Act to do so.

Senator Grosart: Am I right in saying that some of your powers have been transferred to the Department of Consumer and Co-Operative Affairs?

Dr. Chapman: Yes, but only in so far as it relates to economic fraud in labelling, packaging or advertising food, and economic fraud relating to the composition of food. The health aspect still remains with the Department of National Health and Welfare, Food and Drugs Directorate.

Senator Thompson: Referring for a moment to page 13 of the smaller volume where you state that the Public Health Engineering Division is involved in collecting and analysing data to evaluate water quality in the Great Lakes, we know you have control of pollution in federal Government installations, but what do the laboratories do to collect this information—and here I am following up Senator Grosart's question—for example, what do they do if they think there is too much effluence going in? I am still trying to get at the control situation. It is all very well to collect data on all the pollution, but who is going to start saying "Look, this is a threat to health, the plants must close down."

Dr. Bundock: I think the question relates to the area of jurisdiction. I might perhaps mention first of all that, as indicated earlier in several parts of our brief, that under our constitution we share responsibility in the field of health with the provinces. There are of course areas which are clearly provincial and I can give as an example of that a situation if you had a pollution problem right in the heart of a province. That would be provincial responsibility.

Senator Thompson: But does the lab make its findings known to the province?

Dr. Bundock: Yes. At the moment I am just dealing with the areas of jurisdiction. Where you have a boundary area like the Great Lakes or an artery like the St. Lawrence River, the department has over the years assumed the responsibility for pollution control in all of these areas. In addition to that there are international responsibilities by treaty under the departmental act. We have to assume joint control of the pollution problem in the southern part of the country particularly the boundary areas, like the Great Lakes which, again, is a good example.

Senator Thompson: So we get this clear, you say that in a large river your department assumes control. Can you close a plant down if it is polluting such a river?

Dr. Bundock: It has assumed certain control, but not altogether; certain control is shared with other departments of Government. There is a number of other departments which have responsibilities for the maintenance of the waters.

Senator Thompson: Specifically, what control have you assumed?

Dr. Bundock: By and large the department makes continuing studies, and they are related to the aquatic life of the water, and they relate to the collection of data and the degree of pollution, on a continuing basis. This data is collected systematically by a permanent staff distributed throughout the country on a regional basis.

Senator Thompson: Apart from having collected the data, what control have you assumed?

Dr. Bundock: The collection of the data is usually the first part of an investigation, and it leads after that to recommendations. Perhaps I can illustrate by way of example. A province would have, let us say, a pollution control scheme in a river where a woollen mill is discharging its industrial waste...

The Chairman: Let us limit ourselves to an international river or an interprovincial river, where the federal jurisdiction is fairly certain.

Senator Grosart: Could we stick to control? I am only interested in control.

Dr. Bundock: The control function in this instance would be of an advisory nature.

Senator Grosart: No such thing.

Dr. Bundock: It would collect the data and would advise, if it is within the provincial boundary, the province.

Senator Thompson: But at the federal level, who would you advise if you saw too much effluent going into the St. Lawrence River?

Senator Leonard: Take the St. Lawrence River. What do you do about it?

Dr. Bundock: Another department might be involved.

Senator Leonard: Why?

Dr. Bundock: By way of illustration I could give you the controls exercised jointly by several departments of Government, with our department included, preceding Expo '67. I think this is a good illustration, because at that time it was expected there would be more traffic in the area of Montreal located at places where several large rivers are discharging. So at that time there were certainly at least five departments of government and Crown agencies involved trying to look into the area of pollution.

I can name these agencies. Of course, it is our department that has immediate responsibility for the harbour; it is acting in an advisory capacity to the Harbours Board. But at the same time the St. Lawrence Seaway Authority is administering certain parts also that are related; the Seaway has some of the responsibility; it is concerned also with pollution problems. The Department of Transport also had some responsibilities, because of the dis-

charge of certain wastes by some of the shipping. Then at that time there was, of course, the Expo Corporation also concerned because of having invited a lot of foreign ships to be used as hostels in this area of Montreal. So, you have there five agencies of Government all concerned with and assuming joint control over the water.

Senator Thompson: But can any one department of Government close down a plant that is putting poison into our waters to the extent that amounts to a hazard to human life? If any department can do that, then would you tell us which department?

Senator Robichaud: And not only to human life, but to fish life.

Senator Leonard: Senator Robichaud can probably speak to that question. What do you do if it is a hazard to fish life?

Senator Robichaud: I intend to ask this specific question of Dr. Bundock. I know that the department has specific authority to act. It can close down a pulp mill if it interferes with fish life. This has been done, or the operators have been asked to remove the pollution in certain rivers. Action of that sort was taken last year on the Miramichi.

Senator Leonard: But what can it do with respect to human beings?

Senator Thompson: That is a very good question.

Dr. Bundock: I think, Mr. Chairman, we are back to the matter of jurisdiction. To make it a little clearer in our minds I should say that we are shifting from the question of jurisdiction to the technical aspects of the problem. But, again, if we look at it from the point of view of jurisdiction the way that our department operates at the present time is that we assume responsibility for the international aspects of water pollution. We have certain responsibilities in the international field jointly with the United States. We have responsibility in respect of establishments operated by the federal Government. For example, the Armed Forces may have a water problem at a camp. We would act as an advisory department to the Armed Forces. These are major areas...

The Chairman: But, at present, you cannot force the Department of National Defence to close a camp.

Dr. Bundock: Mr. Chairman, as I mentioned earlier, we act in an advisory capacity. Where, under the Constitution, the provinces have jurisdiction, then it is their responsibility to regulate and control these areas of public health.

In addition, to that, at the request of a province—and this is now a standing arrangement—we are providing through regional officers advisory services to the provinces, perhaps on a continuing basis such as in the Maritimes where we have several projects, and where we provide advisory services to the provinces on water problems which would normally fall within strict provincial jurisdiction.

Senator Grosart: Dr. Bundock, I assure you that I am not going to ask any witness here: "What are your powers and responsibilities in respect of setting up an advisory committee?"

The Chairman: What do you mean by that?

Senator Grosart: I am not going to ask anybody that question. When I have asked about control all I am told is something about advisory committees.

The Chairman: The department has said it has no control.

Senator Grosart: That is right. I hope I am trying to help. I want to see somebody given control and power, and in certain areas I would like to see your department given the power and control.

Dr. Bundock: Senator Grosart, there is at the moment, as you know, at the federal level a department which has overall managerial authority. I am referring to the Department of Energy, Mines and Resources. We are advisers to that department, but it has now, I believe, statutory authority to initiate action in terms of general management of water problems across the board, and that would include not only certain technical aspects that we have been discussing but some of the other aspects such as economic aspects and other related aspects, but on a greater scale than the strict public health aspects which I have defined and which fall under the general management of this particular department.

Senator Grosart: Your own brief says that the co-ordinating authority, if you can call it

"authority", has been transferred, but it is still the same thing; it is still co-ordinating. I recognize that you are concerned about this. I do not want you to think I am being critical, because I point out that you do say, speaking of the radiation problem:

There is an urgent need therefore to extend related health services and to develop more sophisticated techniques for early detection of radiation accidents.

I know you are aware of it. I have lots of other questions, but I am going to pass now, Mr. Chairman, so that others may address their questions.

Senator Robichaud: I have a very brief question, supplementary to that asked by Senator Thompson. On page 13 you mention the preservation of satisfactory water quality in the Great Lakes and say that a laboratory is maintained in Kingston under the auspices of the International Joint Commission, which, as you mention, involves federal, provincial and the United States governments. By whom is this financed? Is it financed by the Department of National Health and Welfare or by funds made available through the International Joint Commission?

Dr. Bundock: We have an annual appropriation in our vote for the cost of operation of this division and its services, including the cost of equipment and maintenance, which costs are listed in the divisional budget. It is reviewed annually on a program basis and adjustments are made on a program basis.

Senator Robichaud: In other words, you are providing an international service financed through appropriations made available to the department?

Dr. Bundock: I would mention that this is done under treaty and by the enforcement of a treaty. I think it is on a shared cost basis between the United States and our government.

The Chairman: It is the 1909 treaty.

Dr. Josie: I think that in general the International Joint Commission does not provide funds for carrying out studies and investigations it sets up under its terms of reference, and does not generally provide for these control operations. In particular, the Kingston office comes under the public health engineering division and is supported by funds from our budget.

Senator Robichaud: In other words, it is operated quite differently from, say, the joint agreement the Department of Fisheries has for lamprey control in the Great Lakes, which the federal, provincial and United States governments share jointly.

Dr. Josie: I am not familiar with that.

Senator Leonard: I have a question relating to the Health Resources Fund. In volume 1, at pages 206, 207 and 208, you set out a \$500 million fund appropriation suggested for a period of 15 years, which works out at about \$30 million a year. I notice that in 1966-67, the first year, some \$4,700,000 was spent, which is natural in the first year. In the second year some \$32 million was spent, or roughly one-fifteenth. I should like to have a progress appraisal of this fund. For example, does it look as if the requests from the provinces for projects that comply with your rules and regulations will outrun the \$30 million per year carried forward for 15 years? Would the fund be exhausted earlier if you were able to fulfil the projects or is it the other situation? To the extent that projects have been approved so far, does it seem that it has been satisfactorily spread regionally, and is duplication being avoided? Also, are the results, the expectations of the program, being reasonably well realized in the project so far? That is perhaps one broad question on which I would like to have a progress report.

Dr. Bundock: I will deal first of all with the question of expenditure, the amount allocated and whether we have outrun the annual allocation. As you indicated, the total amount of \$500 million is spread over 15 years. A proportion of that fund is on a matching basis, so the first \$300 million have been allocated to the provinces on a matching basis. There is an element of \$175 million which is on a non-matching basis and an additional amount of \$25 million, which is a special allocation made to the Atlantic provinces. With regard to the amount expended to date, I would say that the submission already by far exceeds the amount earmarked.

Senator Leonard: Exceeds the \$500 million?

Dr. Bundock: If you divide the \$500 million by 15 you would have roughly \$30 million a year. We have more submissions than that at the moment. That is the point. This amount is cumulative; in other words, it is a per capita

allocation. If this year the province submits an amount in excess of the annual appropriation, it could use its own amount because it is earmarked per province on a per capita basis. It could still benefit from the fund the next year, but usually this kind of program is on a five-year basis.

I think the other important part is the question you mentioned earlier of planning and whether there is a duplication. This was planned originally in such a way that the provinces would assume major responsibility for undertaking such long-term planning, and there is in existence a committee chaired by our deputy minister. It is composed of senior officials designated by provinces, and its main responsibility is the administration of that fund. It advises the minister on the quality of programs and on the functioning and effectiveness of programs.

Under the statute the provinces are required to submit a five-year program, and they are expected to plan this in their total resources in the health field. I mention the health field because this relates to all science facilities concerned with research, and to teaching as well. These plans are submitted to the department and appraised by this co-ordinating committee. The five-year plan of a province would represent a normal growth of the provincial undertaking in the fields of teaching and health. To this date it has been satisfactory. Perhaps I might mention that it has had the effect of promoting a far greater degree of co-ordination in the use of facilities for teaching the various sciences, and there is now arising and spreading across Canada what we describe as the health science complexes. This, by the way, is described at some length in Volume II of our brief. The provinces are planning more and more health science complexes. University of British Columbia is a good example, where they lump together in one academic centre in the area of health, medicine, dentistry, veterinary science and social science in some instances. This has had the net effect of promoting co-ordination of teaching in many of these disciplines. There is now an interesting feature whereby the teaching has been reorganized in a new approach to total planning in health. We are promoting that and have had meetings. We have called in the university group responsible for planning those facilities. It is largely due to these funds that this process has been stimulated and is shaping in the way it is.

Senator Leonard: If that works out satisfactorily, perhaps the \$500 million will not last fifteen years.

Senator Grosart: Is this one of these matching open-end programs of federal-provincial co-operation out of which the federal Government has announced its intention to opt? Is this another program in that category? This is an important question, it is a fifteen-year program.

Senator Leonard: It is limited to \$500 million, with the suggestion of fifteen years. That is not open-end.

Senator Grosart: I am asking the question.

Dr. Bundock: I can answer that very clearly and without any equivocation. At the moment I do not think this comes into the ambit of sharing as you mentioned, but what will happen later I do not know. I would not think it would happen within the period of that legislation. It is a long-term program which is just starting, it is on for two years. It is a facility that will maintain science in which this committee is interested on a long-term basis. That is the place where the staff will be educated, and our future scientists, and where a great deal of the fundamental research is taking place right now, and which we are recommending in our brief as one of our recommendations.

Senator Thompson: Is there any other area associated with this where the provinces assume or hope they would get matching credits and find that they are being cut back? Specifically I am thinking of McMaster University. The province entered into an agreement for the building facilities, moving out staff, to get in, and now are anticipating a cutback, in order to develop this according to schedule.

Dr. Bundock: These are really statutory grants. The provinces are responsible for the five-year plan.

The Chairman: And the allocation within the province.

Dr. Bundock: There is a limit annually because of the overall budgeting which is a matter for federal administration. Each minister has the responsibility to draw on the fund. Under the statute, the minister makes a

request for funds to finance the program but this request has been set at a rate which those in charge of the funds deem reasonable, and it corresponds roughly to about one-fifteenth of the annual expenditure.

Senator Thompson: Thank you very much.
The committee adjourned.

MORNING SITTING (second and final session)

Ottawa, Thursday, November 28, 1968

The Special Committee of the Senate on Science Policy met this day at 10 a.m.

Senator Maurice Lamontagne (*Chairman*) in the Chair.

The Chairman: Would you like to begin, Senator Robichaud?

Senator Robichaud: May I be permitted, Mr. Chairman, to follow up some questions that were asked of Dr. Bundock yesterday regarding the analysis of water in the Great Lakes made through the laboratory at Kingston? On page 13 of your summary you say:

Under the Bi-lateral Memorandum Agreement on Shellfish between the United States and Canada, the responsibility for administering a shellfish control program has been given to the Department of National Health and Welfare, and more specifically to this Division. This involves the operation of the complete shellfish program in the Atlantic Provinces and the certification of provincial programs in Quebec and British Columbia.

The reason I am following this up is that yesterday it was indicated that there might be an apparent lack of control and authority. Perhaps Dr. Bundock could explain how this program is operated. My understanding is that the analyses are made of shellfish beds, that is, clams or oysters, by the Department of Health and Welfare, and the control is done by the Department of Fisheries through regulations; that is, they close clam beds and oyster beds, if there is any sign of pollution. Is this right?

Dr. Bundock: Mr. Chairman, perhaps I can mention the authority first and then I will ask Dr. Josie to explain the actual operating mechanisms. The authority is based on the

bilateral agreement that is called the Bi-lateral Memorandum Agreement on Shellfish between the United States and Canada. This provides for the control of shellfish areas where these shellfish programs are operated. The actual regulatory control is exercised by the Public Engineering Division as their statutory responsibility. This is provided, as I said, in that agreement, the purpose of which is to insure public health protection.

If any shipment of shellfish is made to the United States, we want to provide the assurance that prior to its delivery the conditions for controlling the state of the shellfish, that is, in so far as public health is concerned, will be met.

I am sure that Dr. Josie can give you more details about the mechanisms. He could tell you how this is done in various regions. But perhaps I might mention, Mr. Chairman, that these agreements are, in practice, administered locally by regions, and the laboratories are located largely in the Maritimes and on the British Columbia coast, where these industrial areas for growing shellfish are located for the most part. The regional offices are in charge of the administration of the regulatory control.

Perhaps Dr. Josie may wish to add something to that.

Dr. Josie: Mr. Chairman, there is little I can add except to say that the central purpose of the public health engineering activity is to certify that the conditions under which the shellfish are produced meet certain requirements. These are essentially the American requirements which were prepared for this purpose. We are certifying, really, to the American authorities that the conditions of production in the waters meet certain standards. You are asking, though, sir, particularly about our control beyond that. So far as I am aware, beyond the actual certifying or withholding of the certification, we do not have authority. I think that was your question.

Senator Robichaud: Is it not a fact that other departments have some control? Do you not send the analyses to the Department of Fisheries and then, under regulations in the Department of Fisheries, that department has the authority to close oyster beds and clam beds and prevent all types of fishing in certain areas? Am I correct in assuming that?

Dr. Josie: I am not actually in a position, sir, to say that that is either correct or incorrect. I am sorry.

Senator Robichaud: Perhaps, Mr. Chairman, when we have the Department of Fisheries here they will be able to give me the answer to that question.

Dr. Bundeck: Mr. Chairman, I am prepared to say that that is so. The certificate is written and issued to the Department of Fisheries. We look at the health aspect and they look at the broader administrative aspect of the program.

Senator Thompson: When we think of the Ruhr which is probably one of the most heavily industrialized complexes in the world, and the fact that they have been able to keep their water, as I understand it, fairly clean—and as you know, this is just a little river that travels through this highly complex industrial area—and then we think of our own industrial complex which is spread right across Canada and we wonder what the answer to the problem is. I recall Dr. Grey said he felt that the time has now come that pollution is a matter of regulation and legislation. Would you agree with that?

Dr. Bundeck: Mr. Chairman, perhaps I should highlight the trends which are now taking place throughout the world. Maybe I could first deal with our own Canadian problem. Earlier I made mention of the terms of the public health control in this environmental health aspect. The trend is now evolving, and I am referring to the United States and to some parts of Europe where they regard this kind of problem as being one of straight legal control, but it is one factor only. What usually happens, you see, is that it may be that this problem is under the jurisdiction of several levels of government. Usually there are committees set up which eventually through a commission or some body of that sort takes over the authority to deal with this complex problem. It is done on the systems analysis basis. They determine the extent of the problem and the various facets of the problem and see who is involved and who is the authority.

It is something like the problem we had in Montreal to which I referred briefly yesterday in commenting about preparations for Expo. There they found during that time that the harbour was heavily polluted and the people preparing for Expo asked for advice and our department was involved. At the time the department created a special committee, a health advisory committee, and it ended up with a structure of an administrative framework where several jurisdictions were involved to look into this problem.

I may say that the objective was a clear-cut objective; it was to clean the water and there were at least five agencies involved at this level. There was the Department of Transport which was concerned because of certain amounts of waste discharged from ships, there was the local Montreal municipality which was involved because they are discharging a great deal of other waste there, there was the St. Lawrence Seaway Authority which is administering the Lachine Canal, and there was the Province of Quebec as such which had the regulation of some of the statutes and municipal laws.

As I say, this committee was formed and was in existence for the duration of Expo. All these agencies worked well. In the end the water was clean. They developed their own engineering services and several projects were staged over a period of years. The end result was that the harbours and the dikes were quite nice. It was quite cleanly done through the engineering projects. I mention this as an example. There was an objective to be attained and everyone gave away a little of their jurisdiction and in the end the harbour was relatively clean. However, this applies not only to Montreal. We are doing this work now in a number of harbours, and the National Harbours Board agrees that it is a decent program and an effective program. We are moving to Halifax now and after that it will be Vancouver. We think we can in this fashion provide a similar service there. It is a sort of global overall health administrative set-up and it has proven that it is effective. However, if you were to stick strictly to the books of laws you could never get anywhere. But as I say, all these jurisdictions sent their representatives so as to achieve this objective. The main consideration is that everybody concerned must be determined to lick the problem. And at Expo, as I said, there were a lot of interests involved I have omitted mentioning the engineering services of the Expo corporation themselves at the time because they had interests on the island themselves, but they also played a major role in the planning.

Senator Thompson: I appreciate the complexity of the problem, but I am thinking at the moment of Hamilton and of the extent there of the problem of pollution. You mentioned going to Halifax and Vancouver but I would say, with all respect, that while you are moving at a rapid pace, there is a hard

battle still to be fought in Hamilton and I could keep on listing many other Canadian cities.

Dr. Bundock: I don't want to get away from the problem. But it happened at the time the committee was established that there were at least seven or eight major environmental problems, some of a formidable nature, and you have to think in terms of the resources you have. We had a rate of expansion at the time which was quite taxing. It was, as I say, one of the most formidable problems at the time. But it has been partially licked although that meant more resources. However, in that connection water pollution is not the only problem. You have the whole area of transit involved. You get the ships and several other areas and you also have the air problem because while they are in harbour you have the smoke from the ships. Now while I mentioned the water control committee, we had seven subgroups working in specific areas so the department has planned as a long-term program and hopes to do the same thing now in various other harbours.

Senator Thompson: Taking, for example, the question of chromes where they are making parts for cars with the use of chrome I understand that the effluence from such a factory into the lake can be dangerous not only to fish but also to human beings if it gets above a certain percentage.

Dr. Bundock: This is another statutory responsibility we have in the department. Our division is administering a number of labs that do regular work in this field of toxicology and it is doing a different type of study leading to learning the extent of these problems and how they affect human beings. As far as this toxin is concerned, I would like Dr. Josie to speak on that, because he is associated with expanding the program.

Senator Thompson: Is there someone actually in the field going to the area surrounding these plants to check the amounts of water?

Dr. Josie: The occupational health division which carries on this kind of work was on a special study basis on request. The requests generally come from the provincial health department, if they need some additional support for studies or co-operative effort. There is no regular monitoring for the special hazard you mentioned. Studies are made with the co-operation of the provincial and local health agencies and with the co-operation of

particular industries. It is a co-operative effort on the part of the Government agencies at all levels and of industry itself. Very often these undertakings are done in co-operation with industries but I cannot say whether the particular one you mention is being explored currently by our department.

Senator Kinnear: I would like to pursue this matter of pollution and I would like to confine it to a particular area with which I am very familiar, that is, the Niagara area. Every known agency is involved, because it is an international situation. I cannot stress enough the concern we feel in the area of Lake Erie, the Niagara River and Lake Ontario for the very rich land there and what is happening to it. This has to be regarded not only from the point of view of welfare, in the case of pollution within the lakes but also from the point of view of pollution within the soil. The latter is due probably to insecticides. The gardens of that land are right against the road and I am wondering what research is being done on the effect of spraying on these garden lands. The farmers in the area—and particularly those engaged in the growing of fruit and vegetables—are given times for spraying, but I often feel that the spray is probably on the fruit when I get it or in the vegetables. In particular, there is a lot of lead in lettuce. Therefore, I would ask you to enlarge on the whole question of pollution. If it is a matter of money or if it is a matter of getting together to deal with it, surely that is the spot where we should be active. You have spoken about the Marina. I look on it from my home all the time. There is great pollution there. I look at the harbour and the elevator there and I see all the pollution that is left. I believe that we are not getting right down to the point where we are taking action in cleaning up; we are analyzing, we know all about it, but when and how do we get to the point of cleaning up the area?

Dr. Josie: The word "pollution" is a global one. You have referred to pollution through insecticides. Do you wish to restrict the discussion to that?

The Chairman: Yes. Take that, and water pollution.

Dr. Josie: If you take the water pollution alone, you come into a very complex question. There may be insecticide reaching

water, which may go into food and may be absorbed by human beings. I would like Dr. Chapman to say something about that, as this is the area where we are trying to pinpoint scientifically to protect the health of the people.

Dr. Chapman: Honourable senators, the Food and Drugs Directorate is examining approximately 3,000 samples of food per year, taken from all parts of Canada and selected specifically in those areas where we feel there is the greatest possibility of significant residue. I can assure the committee that there does not seem to be any reason for alarm. There is only one area where we have detected significant contamination of the soil to the point where significant residues were appearing in the crops grown on that soil and where they were being carried through into dairy products and appearing also in the vegetables grown in the area. The area to which I refer is a special one, a valley in British Columbia, where there are special climatic conditions and, apparently, heavy applications of a particular pesticide.

If this had been occurring in any other areas in Canada, I feel certain it would have shown up in the crops and vegetables grown in that area.

Senator Kinnear: Have you done anything special around the area of Port Maitland on Lake Erie?

Considerable action was taken because of the death of some of the animals and the vegetation was very much affected there. That area would be about 30 miles west of Fort Erie.

Dr. Josie: Was this not caused, or suspected to have been caused, by effluent from one of the plants in the area?

Senator Kinnear: Yes.

Dr. Josie: This was not due to the application of pesticides.

The Chairman: Do you think that it would be highly desirable at some stage if, at the federal level, there were some kind of agency dealing with all aspects of pollution? Perhaps it could be done by an inter-departmental committee or by enlarging the scope of the responsibilities of the Atomic Energy Control Board. It seems to me that at present we are more or less in complete confusion.

Senator Kinnear: Every agency may be involved, but nothing happens.

Dr. Josie: The problem of pollution is considered now as part of a broader major program, the total management of water.

The Chairman: Yes, but what about air?

Dr. Josie: Mr. Chairman, perhaps you would wish me to deal with air separately?

The Chairman: We are aware of water pollution and the kind of agency responsible to the Minister of Energy, Mines and Resources. But that is only part of the problem.

Dr. Josie: We seem to be getting into another aspect of the total problem of pollution, total environmental life. Do you wish to know what would be desirable as a total environmental program? The Dominion itself has an agency.

The Chairman: So many people are involved in this.

Dr. Josie: I am raising this problem because up to now we have been talking about water problems and pollution. The Government has set up an overall management organization on the water problem, as was indicated yesterday.

Here you have the health problem which we are discussing now. There are many other substantial problems, of a broader economic or social nature. The question of hydraulics comes in, and also that of hydrology and many other water problems, in connection with which we in the department are not equipped. The Department of Mines and Technical Surveys has taken the overall control. Machinery exists and our department is working under the overall practical purposes in broad managerial direction of this department for these particular purposes. In regard to environmental total life, this brings in both air and land.

The Chairman: And pesticides?

Dr. Bundock: Perhaps this is included in the water problem, but at the moment, Mr. Chairman, there is a plan which is being designed to provide the department with the authority to deal with the over-all national problem of air pollution control.

I am talking about the air only. We have met with the provinces, that is, with the Ministers of Health and their deputy ministers, and they have expressed their intention

to participate on a nation-wide scale in that program. They have assured the department that they will be very happy to participate not only in the operating phase but in the administrative phase. We have at the moment this matter under consideration and it has been placed in the hands of the Government. We are at this time trying to co-operate very closely with the provinces. We have their assurance and we would eventually expect to have established by our department a complete nation-wide program to provide for the control of air pollution, and there is legislation already being prepared to that effect at the moment.

I would say, Mr. Chairman, that while you would have the management of water vested in another department, so far as the health aspects are concerned, the environmental total control would be under one department.

As I indicated, we would have still in Health, the water aspect, although the material aspect would be in another department. We would at this time have the public interest in the department and, if this other program materializes, and we have every reason to believe that it will because, as I said, it has almost reached the legislative phase and the provinces seem to be in agreement with this approach, we would then combine and we already have the facilities for doing so. We have what we call the National Environmental Health Centre where all these programs are being administered under one director.

Mr. Chairman, I feel quite confident, particularly now since we have this new environmental centre which was established two years ago, that the problem of co-ordination here in the total environment is, although not 100 per cent in hand, reasonably under control at the present time.

Perhaps I should mention also, and I think it is relevant. . .

The Chairman: You may be right, but I am not convinced.

Dr. Bundock: We are talking science. I can only mention scientific facts. You see, we have at the moment another division which has a great deal of interest in environmental problems. That is the Radiation Protection Division which is also part and parcel of the centre that I mentioned. So you have basically three divisions covering air, water and radiation. These are all under one director in the centre.

We have great faith in having the facilities all under one roof, and the environmental health centre has the capability to handle these things quite well.

I have every reason to believe, on the basis of what the experts have done in the department and after many years of planning, that this centre is equipped in the best possible way to deal with that complex problem.

The Chairman: Although the pollution problem is very important, I do not think that we should devote all our morning to one specific problem. Senator Grosart, did you have a question?

Senator Grosart: Yes, Mr. Chairman. It is a question that brings us back to science policy. We are interested not only in the making of policy but in its implementation, that is to say—the degree to which control is achieved. I think there is a good deal of wishful thinking on the part of all public servants in this area. Dr. Bundock, for example, said that the Department of Energy, Mines and Resources now has “control” of the pollution problem. My reading of the evidence is that it has only “responsibility” for co-ordinating. But I think we slip rather easily into assuming that “responsibility for co-ordination” means “control.” However, these remarks are only prefatory to a question I would like to ask Dr. Chapman, which arises out of a statement contained on page 351 of volume I. The statement is this:

The problem of adequate protection may become more acute if the proposed amendments to the Patent and Trademarks Act result in a substantial increase in drug imports. The use of automated equipment to provide improved capability to analyze large numbers of drugs will have to be investigated.

I wonder if Dr. Chapman would comment on that, because this is the area where the department really exercises a good deal of control. Could Dr. Chapman indicate to us how these amendments to the Patent and Trademarks Act might make the problem more acute. What is your system now for doing research in this area and in translating the results of that research into social benefits that is, the protection of the public? My understanding is that this is an area where you are able to rely on the Criminal Code rather than on departmental regulations. Could you sketch that in for us, Dr. Chapman? It would be helpful.

Dr. Chapman: I will do my best, Mr. Chairman. First of all, the amendments to the Patent and Trademarks Act is contained in Bill C-102, which is currently before the House of Commons. Two major amendments are contained there. One is an amendment to the Patent Act which makes it perfectly clear that a person may apply for a compulsory licence to import a drug, of which the process for producing is patented. The second amendment is to the Trademarks Act which removes the protection of that act in the case of a product which is sold in another country under the same trademark as that which is registered in Canada. A product, for example, from the United Kingdom could now be brought into Canada and sold under the same trademark provided it is produced by the same company, but the Canadian company could not take action under the Trademarks Act as an infringement. That is, for example, alka seltzer could be brought from the United States and sold in Canada and there could be no action for infringement under the Trademarks Act by the Canadian owner of that trademark.

This is part of the Government's program to reduce the price of drugs, and it is felt that this will increase the competition and thereby lower the price of drugs. It will simply mean a change in the volume of work that we might have because up to the present time, of course, we are importing drugs from other countries and the Food and Drug Directorate is exercising control over the qualities of these drugs.

Senator Grosart: Excuse me, would you define that control? Would somebody who wished to sell or put a drug product on sale be required to give samples of that drug to you before it went on sale in order to allow you to analyse the drug and decide whether its effect would be salutary and in the interests of the Canadian public.

Dr. Chapman: No, sir, this is not the case. There are requirements and regulations under the Food and Drugs Act which say that the manufacturer must notify the directorate, the Food and Drug Directorate, within 30 days after having placed a drug produced on the market giving full details as to its composition and its recommendations for use. But there is no requirement for prior approval except in the case of new drugs, and in this instance we require full detailed information before a notice of compliance is issued permitting that drug to be sold freely in Canada.

Senator Grosart: Do you eventually analyse all drugs that go on sale in Canada?

Dr. Chapman: Eventually we should get around to an analysis of all drug products in Canada. But we don't do this each year. We carry out an analysis of a large range of drug products, and these we pick at random from the market and again we concentrate in the area where we anticipate there might be problems in order that our surveillance will be most effective having in mind the resources we have available to devote to this work.

Senator Grosart: Why this 30-day period? It seems strange to me. I don't want you to interpret the intent of the legislation, but is there any sense in allowing somebody to put a drug on the market for 30 days before you find out whether it is in the public interest that it should be on sale?

The Chairman: Whether it is new or not...

Dr. Chapman: In case of new drugs they cannot be put on the market, so this applies only in the case of old drugs. That would be a drug that has been on the market for a number of years and this may be the third or fourth or fifteenth company to put it on the market in Canada and they must notify us that they are selling this drug within 30 days.

Senator Grosart: But a new drug may require a licence.

Dr. Chapman: They require a notice of compliance issued by the Food and Drug Directorate before the drug can go on the market.

Senator Grosart: I believe you have some unusual control over claims that may be made for the use of the drug. Do you have to rely on the Broadcasting Act for authority in this regard?

Dr. Chapman: This relates to the control of advertising. We have authority over advertising provided in the Food and Drugs Act, section 5 (1), which reads as follows. But before I come to that which deals with food, there is a similar section for drugs which I will refer to—it is section 9 (1), and since we are discussing drugs I will read that one.

9. (1) No person shall label, package, treat, process, sell or advertise any drug in a manner that is false, misleading or deceptive or is likely to create an

erroneous impression regarding its character, value, quality, composition, merit or safety.

Now I believe that this does give us the satisfactory control that is required to handle the advertising of drugs.

The Chairman: To control the manipulators.

Senator Grosart: But that is after the advertisements have been shown and a lot of people have been induced to use the drug. Is that correct?

Dr. Chapman: If you would allow me to continue, Mr. Chairman, there is also a requirement under the Broadcasting Act, and I might just read the procedure that has been laid down by the Canadian Radio-Television Commission which is as follows:

The Regulations provide that no continuity, advertising an article marketed under the Proprietary or Patent Medicine Act or the Food and Drugs Act may be broadcast until it has been approved by the Department of National Health and Welfare and by a representative of the Board and bears a registration number assigned by the Board.

Now this means that those continuities that are broadcast either on radio or television require prior clearance. Those advertisements which appear in magazines and newspapers do not require prior clearance. The result is that we have much more effective control over advertising on radio and television than we do over advertising that appears in newspapers and magazines.

Senator Grosart: To what extent do you do research to verify or validate the claims made for drugs? I am not thinking so much of the health hazards as I am of the waste of money, that is the consumer's money, that can be brought about by being induced to spend money on drugs the claims for which have been grossly exaggerated.

The Chairman: It is not a complete waste. Some live with that.

Senator Grosart: Indeed, and one may find that some get psychological solace out of a useless drug. But I wonder if you do research to match claims to function.

Dr. Chapman: Yes. If I may explain, we have an advertising, labelling and registration division in our bureau of operations that carries out continuous monitoring of advertising

for food, drugs and cosmetics on the Canadian market. Whenever this unit runs into difficulties in regard to a specific claim and need expert advice, we have drug advisory services which is headed by a physician and includes medical doctors, pharmacologists, biochemists and representatives of other disciplines, and these people are competent to comment on the claims for any particular products. Now if there still is a question as to whether or not this claim is justified, then we have the research laboratories in our division of pharmacology to carry out the necessary research if we reach that point.

Senator Grosart: Is there very much of that done? Is there very much research at the pharmacological level, or perhaps I should say pharmaceutical level?

Dr. Chapman: No. We are not carrying out very much research because actually few claims are made for pharmaceutical preparations. The reason is that the effectiveness of these drugs is sufficiently well known that the physicians and pharmacologists in our drug advisory services can evaluate those claims adequately. It is only the occasional case where we have to resort to our research laboratories to provide us with additional information.

Senator Thompson: Mr. Chairman, if I might ask a question about mental health. As I understand it, you look on this as a problem that is certainly demanding of the Department of National Health and Welfare the highest priority. Am I correct in that?

Dr. Bundock: Mr. Chairman, this is so.

Senator Thompson: I look in the back of your book and see that you only have a staff of three allocated to mental health while under physical fitness you have a very large number of people. It seems extraordinary to me that you would only have three people to tackle the problem of mental health across Canada.

Dr. Bundock: Perhaps the report indicated the scientists which are carrying out scientific activities. I believe it refers there to the psychiatrists, psychologists and the social workers. The division has a slightly larger staff, and Dr. Josie could indicate the exact size.

Dr. Josie: The staff started with 10. There is not a full complement now. What was reported there was, I think, for the scientific staff.

Senator Thompson: In your Summary and Recommendations, at the end of that book, Appendix B, page 2, under scientific and professional staff, people on strength.

Senator Robichaud: Is there not also a problem of provincial jurisdiction?

Dr. Josie: Do you want me to clarify the program and how the department approaches the problem of national health? Over the years, the department has been conscious of this No. 1 problem in its totality, the fact that nearly one-tenth of the people at one time required treatment in some way or another. Over the years, the approach has been to look at this problem from the federal, provincial and voluntary approach, the total approach. The Dominion Council of Health, which is the primary advisory body to the Minister, has also been involved. The function of this committee is fully described in an earlier section of the brief. It is a provincial responsibility, under our constitution, because of the very large volume of service required to handle mental illness.

In co-operation with the provinces, through the Dominion Council of Health, the Department has developed several programs over the years. Apart from having a division, the most important of these is the National Health program. Since 1948 an annual grant in aid has been made available to provinces. It is in the neighbourhood of \$7 million this year. It is allocated on a per capita basis. It is used for three main purposes. It has a service aspect, for service purposes, the training of staff and the provision of a research program. Both the department and the division work in close co-operation with the voluntary agencies. For example, the Canadian Mental Health Association is one.

This is not only a federal program but a total national program. I would like to take this opportunity to underline the fact that most programs which we are operating are really federal-provincial programs, in the sense that the provinces have jurisdiction in the field of health but we are expected to provide leadership in certain research fields, assisting in some financial programs and other related matters.

We see these as very long-term programs. As long as they are involved with provincial administration, via the Department of Health, we believe this is the best approach for policy reasons.

The actual scientific aspects of the problems are working very well. Looking at the picture as in 1948 and now, taking a straight inventory of the situation, there is no doubt that the advances made are dramatic, for anyone who has access to the information in the mental health field.

Senator Thompson: Since this has such a priority, I am thinking of the three people on the staff. I am trying to think now of areas where the federal Government could give leadership in this field. That leadership might be, first, in an inventory of what is being done all over the world, what breakthroughs have been made. Surely this information could be co-ordinated and examined by some team? That team would go over and then would go across Canada telling the people about this. Now, I could not see three people doing all this. I can see many needs, where you might start, initiate, advise and encourage. I could see a staff of a hundred top-knowledge people being employed in this work.

Dr. Bundock: It may be this is a problem of organization and management, in looking at it as a nationwide problem. We take the view that we must mobilize the maximum of effective resources. On the mechanics of it, we are discussing now how we can get that knowledge from all over the world. The Department, through the Minister, has invited a committee of experts and the advisory committee on mental health has met all the top thought in the country, it has met all the mental health directors of the provinces, the most outstanding people in the academic field and related fields in psychiatry, psychology and so forth. There is an advisory group to the Minister which is in this way tapping tremendous resources. Through the provincial directors of health, there is access to people in academic centres who are highly qualified. This advisory committee has a number of subcommittees dealing with specific problems. It is not a division of only ten or twelve people, it has at its disposal the best equipped people—and when I say “the best”, you have only to read this to believe that—to define problems and at the same time to have an operating role.

When you define a problem, usually the mental health director, with the provincial staffs attending on the committee, compare notes and there is a co-ordinating mechanism already in existence, apart from the exchange of knowledge.

Therefore, for a minimum expenditure, we have very effective mechanism to transfer knowledge.

Senator Thompson: Without mentioning the provinces by name—as I do not wish to embarrass you—do you know which province has the highest facilities for treatment of mental health in Canada, which province is far ahead of the others.

Dr. Bundock: I would like Dr. Josie to answer that.

Dr. Josie: I personally would not feel competent to express an opinion. I feel that our division is in a position to form an opinion of that kind, on the relative stage of development of mental health among the provinces. That is one of their functions, not in the sense of making invidious comparisons but rather through an interest in improving the level throughout the country, seeking ways to do that, by indicating the components of good programs, advisory committees, and so on. That is one of the functions of a division. You mentioned, senator, the desirability of having experts from the department going across the country explaining about development. This is actually done.

The chief of that division, who is a psychiatrist, does travel from province to province, and it is two-way communication: finding out what is going on there and imparting what he knows about what is going on elsewhere. This is one of the devices for having an exchange of information. It is informal, but it is carried on on a fairly regular basis.

Now, you raise the question of the relative size of staff. That is always a problem, of course, and the department, the division and the Government are very conscious of that.

Dr. Willard: Mr. Chairman, if I may just add a point, since Senator Thompson did make a comparison with the fitness and amateur sport program. First of all, may I say that the director or the consultant in charge of Mental Health Division is one of the leading psychiatrists in Canada, a very well known person, Dr. Davidson, who headed up the mental health program for many years. Part of his function is to act as liaison with the World Health Organization, and also to carry on this linkage, as it were, with provincial programs. I think Dr. Bundock and Dr. Josie have described this kind of activity. A very important part is played by the advisory

committee to the minister on mental health which taps not only the resources of the people we have in the field federally but also the provincial deputy ministers and other people.

When you come to the fitness and amateur sport program, I like to think of it as a positive program in terms of leisure time and it is important in the field of mental health from that point of view in the kind of complex society we have today. The very fact that "physical" was not put in front of "fitness" under that act, and it is a fitness and amateur sport act, means that there was some concern about this activity.

Now, of the moneys available under the fitness and amateur sports program, only one-fifth is provided for fitness channels. Four-fifths of it is available for dealing with sports governing bodies operating on a national front. There are over 40 of them. So it is a very large program where you are dealing on a national level as compared with the mental health division, which is dealing largely with provincial agencies.

Further, within that program you have several programs. You have a research program, you have an information services program, you have a scholarships type of program and in these you have programs where you are dealing with these national agencies so that the staff reflects quite a different type of program and a different framework, as it were.

Senator Thompson: I appreciate this, Dr. Willard. I do not want to decry physical fitness either. But I want to emphasize that mental health is a major problem. I will say, personally, that I think that some of the provincial institutes in which poor people are housed should have been bulldozed down about 50 years ago. They are shocking series of mausoleums of ancient approaches to the problem of mental health. I do not think we can be complacent about this. I would like to see the federal Government taking a great deal more active participation, and one way, certainly as a layman it seems to me, would be to see a much larger staff. I can see other approaches attached to this. I have read this book, *Communications in Science*. I notice in it the term "medlars", an approach which I am sure you are aware of having to do with computers. We had the Department of Agriculture here and they were telling us that the new approach that is going to take place is that every individual farmer, if he wants to, can have an analysis of his business and approaches to better business management.

I can see doctors, with all respect to that very wonderful profession, perhaps needing also some assistance like that. I just wondered if you are moving toward the use of computers, and I was thinking again of mental health where one man has to travel across Canada and Dr. Davidson has to go over to try to get news of developments in Europe. What about using modern devices. Are you considering this?

Dr. Bundock: Mr. Chairman, I would like to preface my remark by saying that I think we have even gone perhaps too far in our brief by writing too full chapters on communication. It is agreed that the communication problem is perhaps the outstanding one in the scientific field. No one can question that. While you relate this to medicine alone, I would like to say that it is a total problem involving all science *per se*.

This being said, our department has over the years become more and more conscious of that problem. This sounds like a bit of history, but a few years ago—and this again is because of the mounting volume of scientific literature which has reached over a million new articles a year—our department was confronted with a very sharp and acute problem in research, in having to have access quickly to the kind of literature our scientists needed in order to go on with their research. This was phase number one. This led to the establishment in our department about four years ago of the departmental committee on health communication. I say health communication, because it was agreed at the time at the deputy minister level that we would do the health phase first and then after phase one it would be the welfare phase.

Well, to try to restrict my comments because the time is limited, I would like to mention that this committee has worked for three years and has done a survey of existing systems in what was considered at that time the advanced countries in this field. It has done some operational research and evaluation of the ongoing programs in this field. After doing this we were closely associated with ongoing studies sponsored by the Science Council as consultant and contributors and this led to a complete system analysis of information problems from coast to coast. This has been a long study, having lasted for two full years. The main study was conducted by the Science Council, but the staff of our own department was seconded to the Science Secretariat in order to help the federal

groups, the ones concerned with communication problems at the federal level. While this sounds like a long story, parallel to it our own departmental committee went on planning, and a year ago the department submitted a plan to the Treasury Board which has now been approved and there is now a complete plan which is already operating. I will highlight the main features of the plan. The objective of the plan is to provide scientific information and technical information in both health and welfare fields to what we call qualified users. By qualified users we are aiming at three kinds of people. We are aiming to make this information available from scientist to scientist, from scientist to what we call in the profession the professional man, and from the scientist to the lay public. We consider now in this day and age that this has been a great lack in the past and has led to an aspect of communication problem, namely the lack of communication between scientists and the public. With this objective in mind the department has done a systems analysis. We have approached the provinces. They have agreed in principle with this overall plan. I may say they have agreed not only in a mild way but have been showing some enthusiasm.

The organizational aspect of the program is roughly as follows: The plan provides for a nation-wide network with what we call nets at the regional levels to serve the regions and we have agreed with the major provinces that they would administer the regional nets. That you will understand easily when you get into the area of scientific communication, you have a tremendous amount of administration to do and we have a great amount of facilities already under provincial jurisdiction. The plan has been written with this in mind. As well as local subnets to provide for practitioners and local universities and the people we call users at the local level—this particular program now has been approved. It has been successful throughout all the phases. We are now reaching a stage where there is a new building going up and floor space has been reserved and we have made an agreement with the central data processing unit to assist us with the automated part of the program and I may say while this plan has been evolving, instead of waiting for a full-fledged operation, the department has already been sponsoring projects at the provincial level, and I am glad to report that at least one province has already developed a complete net covering the wide range of all psychiatric

services. This is one of their direct activities. In that particular province they have now within the broad plan I have described developed in that province a complete network of scientific communication that will assist all their hospitals. In effect that amounts to a setting-up of a central cataloguing service and central documentation service which will provide the necessary material in print. This will be to mental hospitals and clinics and related institutions. This is phase A of a broader program which has been agreed on.

The next stage will be general hospital services. It will be our hope that at some stage the province will be completely merged with the kind of net I have referred to. I would like perhaps to mention that the ultimate objective will be to have a complete nation-wide net, and while I referred to libraries, this would include a special information network which functions along library lines. These networks are now being identified. The centre in our Department of National Health and Welfare will be responsible for the broad co-ordination and control and it will act as a clearing house and it will liaise with foreign countries. We have already been in touch with some, and we have done work with the United States, the National Library of Medicine, which has been visited, and all these arrangements have been made for a long-term program, because there is no pretence to planning a nation-wide program without having—science being universal as it is—we would have to co-ordinate our planning with the most advanced countries for purposes of convertibility. There is also the question of equipment. Equipment has to some extent to be standardized and the system of indexing has to be standardized. So in a sense this program now is evolving. Now, Mr. Chairman, I would like to say one more thing...

The Chairman: Well, if you say it briefly, because we have so many other questions.

Dr. Bundock: It is related to this national science policy; we have a recommendation in this brief to the effect that we would welcome a nation-wide network of information for the purpose of technical servicing not only in our department but embracing all sciences. There is, Mr. Chairman, the study which has been initiated two years ago. We would hope that this could be co-ordinated with our program.

The Chairman: Senator McGrand.

Senator McGrand: I notice that at page 18 you have a half page devoted to cancer. You

mention deaths from cancer—this is No. 27—and I believe there is an increase in the incidence of cancer. Now in these days we hear a great deal about contraceptives, and perhaps one of the most common contraceptives in use is the interuterine loop, and we are fully aware that cancer in women is mainly to be found in the uterus and cervix. Do you foresee any increase in the number of cancers of the uterus due to the increased use of the interuterine loop?

Dr. Bundock: I would like to ask Dr. Chapman to comment on that.

The Chairman: Have you done some research on this?

Dr. Chapman: I am afraid not.

Dr. Bundock: Didn't we have some investigation at one point about the use of loops at our staff meetings?

Dr. Chapman: We have not carried out any research to relate the incidence of cancer to the use of this device. Possibly some other member of the department might comment on the incidence of the use of this device. It would be my opinion that probably the oral contraceptive is the one most widely used.

Senator McGrand: But the interuterine loop is still very widely used.

Dr. Murphy: The question you have asked, senator, cannot be answered at the present time. It just cannot be answered.

Senator McGrand: I realize you have not done the work, but I am calling it to your attention.

Dr. Murphy: But your question was, what do we foresee? I don't think any foreseeing can be done. You could almost toss a coin and say "Well, there will be an increase, a decrease or no change at all."

Senator McGrand: Surely you could not anticipate a decrease.

Dr. Murphy: One could anticipate a decrease, yes.

Senator McGrand: What would be the reason?

Dr. Murphy: Well, not on the basis of the growing use of the device but on the greater use of more preventive measures being employed in the detecting of cancer in the body of the uterus.

Senator McGrand: Well, so far as I know, tests have been made which show that this is the most sensitive area on the mucous membrane. If an old pipe can cause cancer of the lip, I am sure that an interuterine loop which is worn 360 days of the year could be a very pertinent cause of cancer in that area.

Dr. Murphy: I agree that the probability is there. The possibility is certainly there but this is all we can say at the moment because we just do not know.

Senator Grosart: I wonder if I could direct a question to Dr. Willard on the manpower problem.

The Chairman: Could we finish the health aspect first?

Senator Grosart: This deals with health. It so happens that in the brief the two more or less come together at this point. Whereas there is a reference to the welfare manpower side, I think the statement I am going to read applies to all the department's manpower requirements. It is at page 390:

There is a possibility that educational and training institutions as they exist today, will be less able in the future than at present to satisfy the manpower demands of the Department of National Health and Welfare, particularly with the increasing specialization required of our personnel.

Is the reason for this a deficiency in what we might call applied education in the universities, or is it lack of extension work in field training? You say that 40 per cent of your grants go into field training. Is there a deficiency now in our educational system in respect to manpower requirements of National Health and Welfare; and, if so, what should be done to correct it?

Dr. Willard: As this is leaning on the health side, I would ask Dr. Bundock to answer.

Dr. Bundock: That is by way of comment in that report. It results from the report we received from our Director of Personnel. I would like to underline that the word there is "a" possibility.

On the total problem of manpower, as assessed in its broader sense, this infers that this possibility is rather remote, it is not only a possibility but it is remote.

The total program of the department provides for a long-term manpower program in terms of (a) to assist facilities, described at some length yesterday under the health resources fund, and long-term studies relating to the health section under research needed under the health resources program.

The studies now indicate that we need not over-worry about volumes. Quantity and quality are different. We worry more now about the long-term studies, but of a qualitative nature, and also about the close relationship which should exist between our health requirements and the educational system. We are more worried about that. I suggest that the potential we have now, the \$500 million investment, to be matched by the provinces...

The Chairman: When you carry out health manpower studies, for instance, is there not any danger of duplication with the new Department of Manpower?

Dr. Josie: This point is very well taken. Our staff is working very closely with precisely that department. The program has been carefully carved in such a way that there is no duplication. There is still an area which requires more co-ordination, but on a private scale, than these two agencies you mentioned—ours and Manpower.

I believe the Science Council is conducting some studies in the manpower field. Over the years, they have been productive, but not perhaps in quality as one would expect. From some figures obtained from universities, it would be expected that, with all the studies our Government, Manpower, and the Health Sciences Council, are doing, these would be considered as global programs. This is surely one of the seven main aspects of science policy to which I am sure the committee will be giving full consideration.

Senator Thompson: We do not look very well in the *Comparative International Almanac*, which I have here. We are down to thirty-third place; Israel and Bulgaria are away ahead of us. In the population per nurse we are fifteenth; in hospital beds again we are listed away below Austria, Germany, Sweden and so on.

Dr. Willard: With regard to manpower studies, the department has kept track over the years and has carried out almost a continuing inventory with regard to doctors and dentists. From time to time it has carried out surveys of social workers. All this is natural-

ly related to our broader functions in Health and Welfare, and we have liaison with Manpower. So far as I can see, we have had no duplication over the years, so I can set your mind at ease there.

With regard to training of professional people in Canada, we have tended over the years to have a number of little islands. The universities have trained personnel according to what the board of governors decide, as to how many they should train and where they would put the resources. There has been a tendency not to relate this necessarily to the social needs of the country. This is important in health and welfare. This is why there is a considerable shortage of social workers—because in the initiation of new schools the number of people who would be trained was related to the particular environment of each university. At the present time, Government agencies have become more and more involved, because in the case of the welfare people many of these are employed by Government, so there is greater consideration of this.

In the Province of Ontario, for example, there is a Department of University Affairs, which is beginning to look at the total needs in different professional groups. I think this will be the trend more and more, that the provincial educational authorities will try to look at the total educational requirements.

In some areas we still have shortages. In psychiatry in Canada we are quite short; in dentistry, we are also quite short; and in social welfare we have a new dimension being added, with a number of universities starting schools where they will turn out graduates at the B.A. level. This is supplementing the personnel resources we have been getting from the graduate school level. In public health, professional training, the Department has been particularly helpful in providing financial support for doctors who want to specialize in public health and take up careers in the public service, provincial, municipal or federal. This has been very important because the public health area sometimes got neglected in terms of the economic advantages of the private practice. So this kind of provincial training program is very important indeed.

Then, if you take a look at the welfare field, we have been providing assistance to the schools of social work and, at the time we commenced this program a short time back, it did give a tremendous impetus to an increase

in the number of graduates from those schools. In the field of physical education our program for fellowships at the M.A. and Ph.D. level has had a tremendous impact on increasing the number of physical educators across Canada who can play a leadership role in this field. The situation is much better than it was a few years ago before we had the impact of this program.

Senator Grosart: To what extent, doctor, are your health grants directed to developing research capabilities for your department rather than field capabilities? You seem to be talking about field workers rather than about research workers.

Dr. Willard: For instance, in the fitness and amateur sport program I was talking about we do have research fellowships and this gets tied into the research program so that we are trying to encourage that. In the case of the welfare grants program, the mere fact that we have channeled money into areas of welfare research has made it possible for people, who otherwise might have practised social work, to go into the research field if they had a bent and aptitude for it. It has given the kind of resources we need to bring these senior people along. Perhaps Dr. Bundock might mention about the medical science.

Dr. Bundock: You have been referring to the intramural program, Senator Grosart.

Senator Grosart: On page 395, in the components of the solution of this manpower program, you mention Government policy as one of the components. I am interested in finding out to what extent you are actually directing your grants to developing research personnel for your own purposes, that is, for the research purposes of the department? Let me put it this way: are you getting enough research people and are you doing enough research?

Dr. Bundock: I would say, sir, that at the moment the input is fair. We have recruiting going on at the university level with the Public Service Commission tapping talent at the very early stages of students' careers. We have developed over-all programs for total manpower systems. In effect, it is not only a question of tapping the resources from the universities but is a question of going and training our own scientists. While we talk manpower, we have to really look at this from the point of view of the total system of manpower. The policy now evolved, at least in effect in the department, and I am talking

of our own scientists, is something like this: we would like to recruit the best staff and then retain the best that we have and keep retraining them in accordance with the requirements of the departments. This is a very broad statement, but this is done in two ways. As I indicated, our team is visiting universities during the academic year and the Public Service Commission has already been involved, and all formal arrangements have been finalized. These teams are visiting universities and are lecturing on the potential or possible positions that are open in the department. The next phase is the interviews with those students. That is one way of doing it.

Then, in the department we have a continuing training program of the staff, and this involves all fields of activity, including the scientific staff as well. There is a broad training program that is the responsibility of each director of a branch. It is his responsibility to assess on a continuing basis this need in the field of scientific activity, and also the potential that a scientist has.

In practice what happens is that the scientists are divided into two classes—the scientists who carry on research, and the scientific managers. It is very essential that these two—I am talking of the manpower training program—be managed very effectively because one is just as essential as the other, and tomorrow one may be a manager of research. So, there is a very fine system—I will not use the word “sophisticated”—of grading and assessing, and it is not easy. There are so many disciplines in this field, especially in the area of assessment. We put the scientists to a very, very critical evaluation annually, with different sets of criteria. They are put on continuing courses. There is a broad management training program, ranging from sabbatical leave to shortened training, but there are always the two essential criteria—departmental requirements, and individual potential.

I might say that what was at one time a very real problem is less of a problem now, and there is one reason for that, namely, that the director of the personnel division is in the process of automating all of the procedures. In the past this was done manually, and as this was a cumbersome process they have entered into the field of automated practices, and it is a lot easier now to build up a file. We can easily assess a particular man by having all data in respect to him stored in an automatic system, and this again facilitates

the procedure of the evaluation of each individual.

I mention this because the Commission is participating. We are doing two types of research in this. This, by the way, is research as such. One use of the automated procedure is in the upgrading of the quality of management, and the selection of staff—in this instance, scientists—and then the other area is, of course, the use of newer disciplines to assess the potential of scientists. I am referring here to the behavioural sciences; the wider use of the behavioural sciences as applied to the rating of scientists. This is the field.

I might mention that this stems largely from the recommendations of the Glassco Commission, as you are probably aware, and also from some similar research that has been done in the business field and which has provided good results in private business. But, I should say, perhaps, that this is a pilot project. We are entertaining some hopes that this will promote the effectiveness of training programs.

Senator Grosart: The reason why I am asking these questions, Dr. Bundock, is that after reading this very voluminous and fine report one gets the impression that the department may not be doing enough science-oriented research. I can understand manpower research, information research, and so on, but as this is a science policy committee, and this is what we are particularly concerned with, are you satisfied that you are doing enough? I get a feeling from reading the brief that because of the high professional requirements of your administrative and field people you may not have enough left over to devote to scientific research which seems to be terribly necessary in this field.

Dr. Bundock: Mr. Chairman, I think we have tried in the brief to indicate the total science activities. We have used throughout the brief the words "scientific activities". We have done this to make it as clear as we possibly could and I may say this is the first time we have done this total analysis of the scientific aspects of the department. We have approached this from five major headlines or approaches; one relating to research procedures to which you refer, one relating to manpower, one relating to scientific and technical information, one relating to data collection and the use of statistics, and one relating to standards. These are now the main branches.

Senator Grosart: But this is almost derivative research.

Dr. Bundock: The next stage in the committee set up by our ministers and deputy ministers is to look at science as a total project problem and quite some time has been spent reviewing the world literature with the resources we have and we have done quite a bit of it. We are now in the department working in this field most likely by designing a specific area of responsibility precisely to put more emphasis on the research in science as you mentioned very rightly. I think I am right in saying that everyone will agree that we are talking in a decade—or thinking along these terms and we are privileged to have had close access to the Science Secretariat and OECD representatives who have visited the department from time to time and I am entertaining high hopes that through important channels we will be more closely associated with this kind of research that you have outlined.

Senator Grosart: I am sure that from the questioning that has gone on by some of my colleagues that you have got a feeling that we are concerned about the fact that we have in Canada rather specific health problems, such as pollution problems, the solutions to which will not necessarily be provided by international research. I suggest you may have sensed some concern that there was not enough basic and applied research being done on basically Canadian health problems.

The Chairman: I am sure, Senator Grosart, you have noted on page 34A of the summary a recommendation made by the department to give more encouragement to what is called there "fundamental research," but my question would be: how would this fundamental research in the field of health and medical sciences be organized within the Government? I notice, for instance, at the moment we have at least four federal agencies giving grants to research in the field of medical sciences to outside agencies, the Department of Veterans Affairs, National Health and Welfare, Medical Research Council, and to a certain extent also the National Research Council. Now, so far as intramural research is concerned we have a multiplicity of agencies, and I must also mention that in so far as extramural research is concerned we understand that all these agencies or federal granting institutions wait until they receive applications to give grants. Therefore, so far

as this is concerned, priorities do not seem to be too important provided there is an intrinsic merit in the application.

When we come to intra-mural research, we again have the National Research Council, which is doing research in the medical sciences, at least according to the Dominion Bureau of Statistics; Health and Welfare is doing research very closely related to its departmental responsibilities; National Defence is spending, I think, over \$2 million on medical research, and we have been told by Atomic Energy of Canada that they are doing research in the medical sciences related to their own activities. Nevertheless, it seems that in spite of this multiplicity of agencies there is very little applied research. There is mission-oriented research, of course, but at a fairly fundamental level. Very little is being done within the federal Government at this moment, except this more or less isolated operation conducted by the National Research Council.

Senator Grosart: My point is that you might well have said "because of this multiplicity".

The Chairman: I do not think it is only that. It may also be because, for instance, at present the Department of National Health and Welfare has a definite responsibility to carry on, so their research program has to be geared to these activities; in other words, they would not be able to fulfill their responsibilities. It seems to me that because of the importance of this problem for Canada we should go even beyond that. There is no question that your present research activities are absolutely necessary, and probably should be extended in some fields, but even if these activities are carried on, and even expanded, I do not think we shall be in a position to meet our research needs in Canada in this very important field.

Dr. Willard: May I make one or two comments on that point, which I think is a very good one. I do not think we should get disturbed just because you have a number of agencies that are carrying on extra-mural and intra-mural research. Each of these agencies has a focal point for the kind of research they carry out and the focal point is quite different in each of these agencies.

The Chairman: In this field I am not really afraid of duplication. I am afraid that there is a gap.

Senator Grosart: Yes, that is the whole point. If you give responsibility to ten people to do a job you know you are going to have gaps.

The Chairman: I think it is a federal gap; it is a gap necessarily within your department. What I am getting at is this. Should we have some kind of national or federal research institute on health?

Senator Grosart: Yes, that is it.

Dr. Willard: Let me pursue this a little further. This approach might have validity. It may be that the sum total of these efforts is not as adequate as you would get if you had a combined operation. First of all I think you would have to identify what the gaps are, and if there are gaps see whether or not they should be allocated to the existing agencies. That is the first thing. When you take a department such as Health and Welfare and have a public health research grant, you have to remember that that department has continuous liaison with public health people across this country. They are keenly interested in public health matters so that the Deputy Ministers of Health are meeting regularly at least twice a year. They have a technical research committee in the field of public health that is reporting to them and they have kept abreast of public health through research in Canada. So as long as your focus is on the area of general public health, there is a very strong argument for relating this kind of research activity to the people dealing with public health problems day in and day out across the country.

The Chairman: Let us take a related point of view. I will put all my questions together so you will be able to comment. Let us take a related field of research, such as biology. I am sure that we are still spending, as a federal Government, more money on research on the biology of fish than on research on the biology of man. I am not going to attack my excolleagues around the cabinet table. I think they are doing a splendid job there. I think it is true that we are spending less money on research on the biology of man than on the biology of fish.

Dr. Willard: In terms of total focus you can develop an overall national science policy without necessarily having each individual program a part of a national institute. I think you are talking about priorities and overall policy. You could very well determine that

economic interests have decided that maybe we will do more about the biology of fish, whereas social interests have not succeeded in getting priorities for larger sums of money for public health.

The Chairman: And yet fish do not vote!

Dr. Bundock: Now we are really going into national science policy and I am very happy to see, toward the end of our meeting, that it gets into this area of interest. We are talking about research and what the department is doing and, as we outlined earlier, the intramural interests. I think Dr. Willard has put the point on the very major factor and we underline that our total research efforts are really managed by one big corporate body, because it is in effect the council of health that is responsible for the final decision in the management of the public health research branch.

The Chairman: Not NRC or National Defence?

Dr. Bundock: I felt like stretching this point; it is very important. It is done by the provinces and that grant is strictly related to alleviating the total burden in Canada. For the record, it is strictly oriented towards alleviating the total burden of illness and all these factors of illness are graded on a continuing basis. There is a fairly long chapter on policy, if you have the time to read it, which explains how the policy of granting funds for health research is arrived at in this department.

Senator Thompson: But the Medical Research Council is also faced with the burden of illness.

Dr. Bundock: I would like now perhaps to go into a broader field and still stay within the bio-medical field. We have already dealt with public health in the bio-medical field and you have heard the area of research which I would call medical oriented as practised by the profession now, either at the bedside or in certain universities for the training of medical students. This is taken care of by another agency of the Government as we outlined yesterday. We get now into the far more complex question of the total allocation of funds between areas and segments of science, which our chairman referred to earlier and which to my mind is a most difficult one. There is one major reason for it at this time. This applies not only in Canada. I may

say there has been a great deal of literature on that before this hearing today. The major reason is that of information.

Today there is no systematic information available on these broad fronts of scientific activities, in any country in the world, and that is the most pressing need. There will never be any possibility of opting either for one system or another or granting in one field or another.

Much research is being done, with attempts to develop a system, but as long as we do not have a total system of information relating to the management of science on a nationwide basis, I would suggest, Mr. Chairman, that there is no hope of really taking the kind of decision that we are discussing now—that is, how to apportion funds as between various sciences, the physical sciences, the medical sciences, even you get into behavioural sciences and social economic sciences.

The Chairman: We will come in due course to the overall allocation of funds, but at this stage, since we do not have too much time, we are interested now in identifying the important gaps or undesirable duplications. I would like to keep the discussion on this question I put a moment ago, whether there is a gap or not.

Dr. Bundock: Mr. Chairman, I have to say this. As long as we do not have a central agency that is gathering the data relevant to all scientific activities—

The Chairman: We can guarantee you that this will be done.

Senator Thompson: Or we can recommend it.

Dr. Bundock: That is what we are asking, because we do not know where the gaps are or where the research is taking place. At the moment there is no agency or capability for this work. That is the reason why we are so strong in our brief in making a specific recommendation for a beginning by establishing a central agency which will have the capabilities to store the kind of information which will lead to proper decision-making. One cannot take decisions on gaps, on what should be done: one must have made a complete collection of data first and then go into the problem area.

I do not say this in the way of giving a direction, but I say that this is an important area. It is already taken care of by the

Science Council, which has already initiated that discussion, and we are looking forward to the total long-term study.

The Chairman: When you say that you are recommending that support be provided for fundamental research needed to solve departmental problems, what do you have in mind, in making that recommendation, especially in terms of organization?

Dr. Bundock: This one is based primarily on system analysis—while preparing this brief, we have indicated in the methodology, that we have had several meetings on scientific programs. Dr. Chapman could comment on this—in some of the branches it is quite apparent—at least in the Food and Drugs Directorate, that this group is doing so much applied research that it leads to problems of a fundamental nature. A problem of an applied nature leads to a problem of a fundamental nature, where the only answer to an applied problem is to go back and, by and large, this may run up as high as 8 to 10 per cent of the actual fundamental research.

A good example is that in Dr. Chapman's reference to cobalt and beer. This is typical, where in a scientific problem it had to be solved through fundamental research by resorting to fundamental studies in this area. It means that we have put this recommendation in to make sure that, as the years go by, the Department will have the support of whoever is responsible for total national policy in that federal department. I may say that is also mentioned in report No. 4 of the Science Council, which is on record.

The Chairman: Would you like to comment, Dr. Chapman?

Dr. Chapman: Yes, Mr. Chairman, just very briefly.

I may point out that the area of responsibility under the Food and Drugs Act is becoming so highly technical and complex that I feel it is absolutely essential we have a strong research component in our program to provide us with the scientific data upon which to base valid decisions.

Over recent years we have assigned approximately 20 per cent of our manpower and 25 per cent of our resources to the research area, and I am referring to the research laboratories of the Food and Drug Directorate. I feel this is approximately the right proportion that we require to provide us with the data that is necessary.

I might say, Mr. Chairman, also that I feel that one of the recommendations made by the Science Council in their report No. 4 was that all the scientific programs of the Government should be subjected to a regular technical audit by an appropriate body. I think this would be a desirable procedure in order to ensure that the research that is being conducted is of the nature that it should be and that the resources are being expended most effectively.

Senator Thompson: I have here, Mr. Chairman, a paper entitled, "Planning, Programming, and Budgeting in Health," by William L. Kissick, which refers to the United States and the examination of their situation. As they look at their health field they say:

In the health field, rather than replacing the muddling-through process, the planning process of necessity has incorporated muddling through into its methodology...

They suggest there are three weaknesses in the United States:

—the relative weakness in our tradition of research and analysis in the field of health care.

—the weakness of local bodies that deal with the major issues we face.

—the scarcity of people trained in the (necessary) modes of thought and analysis...

On that first part, "The relative weakness in our tradition of research and analysis in the field of health care", as I listen to this I am inclined to think this applies to our health services as well.

Dr. Bundock: I think your point is well taken. I may say also that this article caused almost a furore in our own department. The day after it was published the head of one of our divisions was in my office and said, "This is what we do tomorrow." I said, "That is very interesting, but let us first of all look at what we are doing now." It came out that we are doing the very thing the system was trying to put into universal use in the States.

As you know, about four years ago, the Treasury Board commenced a total program budgeting system, and we are in that very round. There is a complete chapter on that in our brief, which reflects this approach to science, and our committee and deputies have asked us to work very closely with all

branches of the department on the scientific management idea, and this is reflected in that brief.

What you are referring to is very true. There is a greater need of scientific administration in the field of scientific activities, and we have gone to the extent that we are on record in our recommendation No. 4(d) that this very area be brought to a head at least in an institution concerned with the teaching of administration. We wish to develop the capabilities to assess the nature of scientific policy in the years to come. It is, in a sense, using what we call the science of management as a universal process and trying to adapt it to the very kind of problem that we are discussing today in terms of national science policy.

In the department I am very gratified that I have been able to assess this closely while having several interviews with the staff seconded for this project with the managerial groups, and I can mention specifically that they all express very genuine interest and are now taking a direct interest in the area of general management. In the first place, in the financial area, there is a complete program now essentially based on planning, organization and control, slanted towards science.

Initially, we had not extrapolated the factor of science which we are doing now, and I say again, Mr. Chairman, and it is fair to say, that this inquiry has created a great deal of soul searching in our department.

Senator Thompson: But when I look at the large gaps and when I consider Senator Grosart's question to you, of whether you had enough research going on and you answered, "fair", then I wonder.

But I am interested in looking at another area. Here we have a housing commission or whatever you want to call it going across the country dealing with this very real problem of housing.

You have here a reference to the fact that three-quarters of the people are living in urban communities. If the Government wanted to know whether it would be a good idea to build apartment buildings, have you any knowledge of the effect of apartment living on a family? For example, in Great Britain they have done studies on that. You, as the Department of Health should, I would feel, be concerned with family life and the things that affect it. The Minister of Transport in

working out his policy should be able to pick up the telephone and ask you what your advice would be with respect to this problem.

What research have you done? Have you done research on this very large area?

The Chairman: If you want to comment, you will have to comment briefly, because it is already a quarter past twelve and we have not yet dealt at all with the other aspect of the department.

Dr. Bundock: Housing, Mr. Chairman, is one program that is very vital and important at the present moment. We have over the years taken an active interest in certain aspects of housing. We have offered or at least provided consulting service to some of the federal agencies.

Senator Thompson: Have you done any research?

Dr. Bundock: These are the people who are doing the research at the federal level. There is the Central Mortgage and Housing Corporation and there are some of the associate committees of National Research Council that have been created over the years to do certain research on various aspects of housing. So through these channels our own staff, specifically the Public Health Engineering Division and the Occupational Health Division, have been invited from time to time to assist in providing advice. But more recently, because housing is becoming now a problem in which people are becoming more concerned, we launched a departmental study, which is finished now, as to what might perhaps be the future role of the department in entering greater activities.

Now, there are several areas and I am talking only of the health field. I am sure Dr. Willard could comment on the very important aspects of welfare and poverty.

Senator Grosart: My final question, which might be susceptible to a yes or no answer, is: Is there a mechanism existing in the department today to identify and select major programs for departmental research?

Dr. Bundock: The answer is yes, Mr. Chairman.

The Chairman: The answer is yes, but in so far as you are doing that kind of research it seems to me that your research is mostly related to your departmental responsibilities, which are.

Dr. Bundock: I am talking about research which comes within the Department's responsibility.

Senator Grosart: There are two viewpoints here. It is very easy, and it often happens, for the medical profession and the scientists in medicine to be very proud when they make a discovery—when they discover, for example, that there appears to be a relationship between cigarette smoking and cancer of the lung. But the layman says: "Why didn't you find that out 25 years ago. Why didn't somebody look at this problem a long time ago?" It is not really something that medical science can be proud of when after 75 years of cigarette smoking they discover this relationship. That is what I mean when I say there are gaps in selecting the problems.

It has been known, as I understand it, for 30 years that the incidence of lung cancer in males was increasing at a higher rate than in females, and then suddenly the British and the Americans come up with this relationship information. The Surgeon General in the United States begins to get action on this thing. It is possible to have so much methodology that you have not much method.

The Chairman: If you have further views for or against the so-called biomedical research institute to complement our existing research facilities then I am sure the committee would appreciate your putting them in writing.

I think it is about time that we asked some questions of Dr. Willard on the welfare aspect of the department.

Senator Thompson: Mr. Chairman, I have a question in respect to which I know you have an interest. We are presently looking at the whole effect of social legislation on the family, especially in respect of poverty. Let me put my question in this way: You have a whole multitude of services that are provided for people. Are you doing a study on the guaranteed annual income?

Dr. Willard: Mr. Chairman, with regard to the guaranteed annual income we have kept up to date on this approach from the early writings to the recent writings. I guess it goes back to World War II and the Rhys-Williams suggestion, and even earlier back to the Spheenhamland system in Britain. Within the last year or two we have spent a great deal of time in this area, and I think we have tracked down all of the component elements

that are necessary in the decision as to whether you probe into more detailed research. I think one research project that we are very much interested in is that going on down in New Jersey where moneys have been given to carry on a study of negative income tax, or a guaranteed annual income payment, to a control group of a large number of people over a three year period. They are trying to study the effects of incentives, and generally to see the relative advantages and disadvantages of this compared to the normal approach of dealing with those who are on assistance payments. So, I think we can expect a great deal more investigation in this area.

We have had, of course, the advantage that most countries have not had in that we have a guaranteed annual income approach developed with regard to the guaranteed income supplement for the aged. Our research and statistics division have taken great care to develop the statistical data under that particular program that will be particularly helpful for analysis.

We have also been especially interested in the administrative procedures and how this kind of system works, because among the criticisms of the guaranteed annual income approach is this question of how can you administer such a plan which involves a hook-up, as it were, with the income tax operation on the one hand, and the payment of a benefit on the other, and the alternative approaches as to whether you use the previous year's annual income or whether you use the current year's annual income. The big advantage of the experiment going on in the United States is, I think, that they are using the current income and they are making payments every two weeks whereas under the guaranteed income supplement we are making payments once a month, and we are basing it by and large on the previous year's income with some options that allow for adjustments. I think we are probably one of the foremost examples of this in the world including the United States and Britain. We have one of our staff members on the research division undertaking a year of studies in London at the London School of Economics and he is working under Brian Abel Smith and Titmuss and trying to follow closely the developments there. We plan to have a team of several people go to the United States in a few weeks to see the experiment being done in New Jersey.

The Chairman: Are you trying to look at this possible scheme in relation with the adjustments which would be needed to be made to the total social security programs?

Dr. Willard: This is one of the most difficult areas—the question of integration with the existing social security program. Some of the programs could be completely abandoned and others would have to be integrated.

The Chairman: Or modified.

Dr. Willard: Modified, that's right. May I give an example? If you take the Canada Pension Plan where people have been paying personal contributions on a benefit which they expect in the future, and where the level of the benefit of the people who pay towards that program will include people who are above any poverty line that might be covered under any guaranteed annual income and it would be very difficult to interpret to these people that this should be scrubbed. This can give rise to a very serious technical problem. Let us take medicare and let us take the hospital services. It is generally accepted that the better approach to these programs is not to provide people with a payment to get them, but to provide the services. Many people add up our national social security program of expenditure and think this is the kind of money that we have to play with in the guaranteed annual income. You have to factor out these programs and see where you can travel along with the existing system. Taking the Canada Assistance Plan, only part of it is to be offset—a very considerable part—under an annual guaranteed income. The fact that the guaranteed annual income draws a poverty line creates a difficulty when you consider that in a country such as Canada you find that this line in high cost areas might be inadequate. This is as compared with other areas. And so you require a needs test program to taper it off.

Another area is the jurisdiction problem. This is a very complicated one that requires quite a bit of consideration.

Another area is the question of incentives. There is no problem when you are dealing with a group such as the aged, who are largely out of the employment market. The whole question of the impact on incentive when you get into the work force—

The Chairman: Is this a suggestion for further reform of the Senate! I see that in your tables at the end of the summary there is no

intra-mural research program within the welfare part of the department, except in the Research and Statistics Division. Is that right?

Dr. Willard: That is correct. That does not mean some of the senior officers in a number of the program divisions are not knowledgeable in this area. Indeed, they spend some of their time on it, and some of their activities would be very similar to some of the research activities of the Research and Statistics Division. We look to our Research and Statistics Division to provide the leadership role and carry out all the major research projects.

The Chairman: Could you tell us how many people in that division should devote most of their time to research on welfare problems as opposed to health problems?

Dr. Willard: Perhaps Dr. Osborne, the Director of Research, could deal with that.

Dr. J. E. E. Osborne, Director, Research and Statistics Division, Department of National Health and Welfare: In the field of social security we have—

The Chairman: Could we first hear how many you have in the total division?

Dr. Osborne: There are 37, I believe, in the table here. Actually that figure should be 36 according to this distribution, because there is one executive, namely me.

Dr. Willard: Would it be one-third, or 25 per cent?

Dr. Osborne: About one-third.

The Chairman: That means about 12.

Dr. Osborne: About that in both social security and in welfare.

The Chairman: They would be mostly, I suppose, sociologists and social workers?

Dr. Osborne: There are a good many economists; sociologists, social workers, people with a background in education, psychologists and statisticians.

The Chairman: The activities of the division would be another question. For instance, approximately how much of its activities would be devoted to the collection of data and statistics?

Dr. Osborne: Very few of them are concerned solely with the process of data collec-

tion. They are concerned with research projects. However, as you know, in the field of economics and social research the basic substance with which you work is very often statistics, which are collected through data collection procedures, so data collection is an integral part of the research process. It is really more research and development than strictly data collection in the routine sense of the term.

We do, however, produce a quarterly statistical bulletin concerning the various programs of our department. A number of people have expressed an interest in having up to date information each quarter on our departmental program, so this is one of the functions of one of my staff members, but it is not his full-time function. We do produce statistics annually on morbidity in hospitals, which is in a sense a data collection process, but in addition the man responsible for that does an analytical study of this post-morbidity and in order to alleviate programs—

The Chairman: Would you say that this is about the only agency within the federal Government that is carrying on research in the fields of social and welfare problems?

Dr. Willard: There are other agencies that are doing work. The Department of Labour has a research division. In housing there is Central Mortgage and Housing. In answer to Senator Thompson's earlier question, we work very closely with Central Mortgage and Housing on social problems related to housing. The secretariat was in the Privy Council office for a while and carried on some co-ordinating functions.

The Chairman: You did some research on poverty. Is this still going on?

Dr. Willard: No, I do not believe they are carrying on any research at the moment, but this was picked up by the Economic Council. You will recall that chapter in their report. If you look at social research in Canada, I think one of the things that strikes you is that, with the exception of one or two provinces, the provincial departments have not developed strong research efforts, and this is a level where it is very much needed.

At the federal level I think there has been a tendency for research to be program oriented. In other words, as the possibility of certain programs loomed on the horizon attention was directed to those programs. The field of social security I think for instance of a

program such as hospital insurance, and our Research and Statistics Division spent a lot of time on that. When the Canada Pension Plan came along it involved many departments, and our Research and Statistics Division was involved in that. Some research is carried on, of course, by the Unemployment Insurance Commission in regard to its particular program. In terms of social security the tendency has been for research to be built around those types of things.

In addition to that, more recently Mr. Osborne has been trying to develop within the welfare side of his research efforts some kind of potential in terms of the sociological problems that we face today, the problems of alienation and so forth. Also, the extramural research program under Dr. Iverson has carried out many, many projects, which you see listed there, that relate to poverty and specific problems in the poverty area; they have been initiated, some from universities, some from social agencies at the municipal level or provincial level, the Canadian Welfare Council and so on. We have quite a bit under way extramurally in the field of poverty.

The Chairman: Again, you are waiting to receive applications.

Dr. Willard: I think Dr. Iverson spoke to that yesterday. When you set up a research program, such as that one, at first there are not too many applications, there are not too many research workers in the field. Then you stimulate research. The problem is to get satisfactory projects. As time goes on, you get more projects than you have money for. Then you are able to plan an overall pattern.

On the other hand, there is the case where you go out and stimulate research in a particular area, through contract research and so forth.

One of the difficulties is that there are not so many agencies or investigators, and this is in contrast to the health field. You could always go out and say "here is a particular problem, will you take it on?"

We have been building our capacity and getting more and more into that field. We co-operate with the Dominion Bureau of Statistics and we get a lot of material at census time and through special studies which are particularly valuable to these social studies we are carrying on to try to measure the social problems, so that we can relate them in terms of possible programs.

On programs, we are not thinking so much of massive programs as in the past, but of tailor-made programs which may be called economic opportunity programs, seeing how they could fit into the social problems we face in society today.

The Chairman: We have been told by the Department of Agriculture that in their economic research branch they have 25 people to deal with that field. Here you have about 12 people to deal with the whole welfare and social security program.

Dr. Willard: That is a very good comparison. We have over 20 million people. I do not know how many farmers there are.

Senator Thompson: 500,000.

Senator Robichaud: What percentage of the funds allocated to the Department of National Health and Welfare are directed to welfare programs?

Dr. Willard: Mr. Osborne could give an idea—it is about one-third of the total budget—and Dr. Iverson could mention the funds he has in welfare programs.

The Chairman: You mean total expenditures, senator?

Senator Robichaud: Yes.

Dr. Willard: We are up to about \$3.6 billion. When you get into the very high cost programs such as old age security, you are up to \$1.3 billion. As to family allowances, you get around \$600 million. It is difficult to take a percentage which is meaningful. You need a measure in terms of social problems.

The Chairman: But you have the biggest share of the total budget?

Dr. Willard: Oh, yes. I suppose the welfare side—I do not know whether it is to credit or debit but it is the largest budget of any department. Part of the thing that is deceptive about this—and you do not notice it when it comes out in that pie published by the Finance Department—is that the Old Age Security program is not part of budgetary expenditures. So, any time you look at what will be spent you can add \$1,300 million more to take account of our Old Age Security and guaranteed income supplement programs.

Senator Thompson: Mr. Chairman, unfortunately, I and other members have luncheon appointments, and I hope that Dr. Willard

and his colleagues will not think we are not interested. We are intensely interested.

Before leaving I would just like to say to Dr. Chapman that at times it seemed we made some sweeping wallops, if I can put it in my Irish way, but for myself I am very impressed with the work being done. I noticed you sort of frowned at one point at some generalities we were shooting out.

I apologize for having to leave, but it is not because of a lack of interest.

Senator Robichaud: Mr. Chairman, what worries me is that the welfare programs are also administered, as was stated by Dr. Willard, by the Department of Labour and also by Manpower, and in many cases grants are being made to people who are better off living on welfare grants than if they were fully employed. What steps are being taken in order to correct these abuses?

Dr. Willard: Mr. Chairman, if we are relating to social security programs, this could occur in relation to social assistance payments. These are administered by the provincial governments, and the federal role is that of a conditional grant, so that the test is one of need, and in this test of need they are supposed to take into account not only the resources of the family, but also the budgetary requirements—in other words, the rent, clothing, food and so forth. There may be some cases where people are receiving benefits that are of the kind you have described, but in discussing this with the provincial departments they feel that the area of abuses is very small indeed. Of course, this is one of the great problems that you face when you try to administer social assistance. You try to be fair and try to make a kind of payment that a family can get along on and so that it will not be completely disadvantaged, particularly the children and so forth, and at the same time not have payments that cause a disincentive to work.

Family allowances, of course, are helpful in this regard, because in the case of a worker who is working at the minimum wage and who has a large number of children, when he becomes unemployed it is sometimes very difficult to get him back into work when his benefits, through social assistance, may be very close to what he would be earning. With family allowance payments he gets those benefits whether he works or not.

I do not think people worry too much about this factor in terms of older people in Cana-

da, except that in some cases some people feel perhaps the Old Age Security program might have been selective rather than universal—that is the payment up to \$76.50. However, I would point out, sir, that that program, as arrived at on the recommendation of a joint committee of the House of Commons and the Senate, before which you, Mr. Chairman, testified, was agreed to by all parties of the House of Commons and the Senate. In the history of joint parliamentary committees, this was one of the few committees in complete agreement when dealing with a major program.

So we do hear talk about selective programs, and when you come to a major program like that, involving tremendous outlays of funds, and you talk about making it selective because some people are getting the money who do not need it, then I will certainly remind you that it was arrived at by a democratic process which was thought to be the best approach to the problem at the time.

The Chairman: Some of us have changed our views.

Dr. Willard: It may be that views have changed over time.

The Chairman: We have not reached the era of affluence at that time.

Senator Grosart: Dr. Willard, is there any significant amount of research being done to determine the effect of social benefits paid by the state on individual incentive? Obviously, there is a point at which too much in the way of handouts, if you like, although I am not critical of that, would affect incentive and, therefore, affect the whole productivity of the labour force.

Dr. Willard: We have not any over-all surveys. I do not know whether Mr. Iverson has any particular surveys dealing with the provinces in respect of incentives.

The Chairman: You were referring a moment ago to some experiments being conducted in the United States.

Dr. Willard: They were trying to apply a guaranteed annual income approach to see what effect it would have on incentives and see how it compared with the normal social assistance payments in which the people automatically get their payment once they are in the system, with no questions asked, as it were, as opposed to the close investigation that is supposed to take place in the case of social assistance.

The Chairman: I suppose it is not a very good area to experiment in in Canada, but would it be useful to see what has been the impact of the guaranteed income supplement? So far no attempt has been made to see what the impact of that has been. I am sure some of these people were still in the labour force.

Senator Grosart: Not very many of them.

Dr. Willard: Not at age 67 and over. I do not know whether Mr. Osborne has any figures on that.

The Chairman: I do not think it is a very good area, but it seems to be the only one we have available.

Senator Grosart: It is not a good area. Dr. Willard, did your department assume that the percentage of old age pensioners who would be eligible for the guaranteed income supplement would be as high as it was?

Dr. Willard: I think in our estimates of cost that the minister put before the House we were talking in terms of our estimates being something in the order of \$260 million, and the Department of Finance came up with \$280 million. I think it ended up at about \$225 million or \$230 million.

Actually, \$225 million was the first estimate made by our research division. From time to time we have been low in our estimates, and it is a question of trying to guess what the participation rate will be. We adjusted it upwards to a level that would reach about 260, so that you can see that we over-estimated what the cost would be.

Senator Grosart: I was a member of the Senate Committee on Aging which recommended that, and my recollection is that we did not expect anything like that. I think it is 70 per cent now applying for some form of supplement.

Dr. Willard: Yes, and it has got down now to 60 per cent. The last figure I saw was almost 58 per cent, and as we drop down another year, and bring in the 68 age group, the percentage will drop down even more, because more of these will be working. I do not know whether we will get nearer to 55 per cent or 50 per cent when we get to age 65, but I think we will see this percentage drop as the age goes down.

Senator Grosart: The reason why I asked that question about the effect of social benefits on incentive is because there seems to be

some evidence coming out of the studies of the guaranteed annual income that indicate that a certain type of approach may actually increase the over-all incentive by making people more secure and healthy, and therefore it will operate in the opposite way to what most people assumed social justice benefits would operate.

Dr. Willard: Yes, I am sure that is true in certain situations. Where the research is needed, you know, is to enquire where this does apply and in what circumstances. I hope that this study in the United States may be of some benefit in this area, but I am not too sure.

The Chairman: I suppose you will have to deal also with that problem when you appear before another and newer Senate committee.

Dr. Willard: It will not be long, I hear.

Senator Grosart: It will be a marvellous thing if some evidence can be developed to show that an adequate social justice benefit scheme could in time actually pay for itself in terms of national productivity.

Dr. Willard: Yes, if you could so taper it so that there is enough incentive for them to go out and earn the additional dollars. While having at least this platform of income there should still be a desire to go out and earn the

marginal amounts, and part-time employment in many of these cases is involved.

Senator Grosart: Not only that, but there is the relationship of an adequate standard of living in respect of children growing up, and even in respect of adults, so that there is a desire to work. It involves their mental approach to life.

Dr. Willard: We must break the poverty cycle, as it were?

Senator Grosart: Yes.

Dr. Willard: In other words, rather than children getting used to going with the mother to the social assistance office and getting a cheque?

Senator Grosart: Yes, and there is the feeling of equality with their schoolmates, and all the elements that go into making a person productive socially, as compared with those elements that make him unproductive.

The Chairman: On this very liberal note from Senator Grosart I think we might now adjourn. Before doing so I want to thank Dr. Willard, Dr. Bundock, Dr. Chapman and all the others who have participated in this discussion. Thank you very much, gentlemen. What you have said has been very enlightening.

The committee adjourned.

APPENDIX 11.

1. DEPARTMENT OF NATIONAL HEALTH AND WELFARE

BRIEF
TO THE
SPECIAL SENATE COMMITTEE
ON
SCIENCE POLICY

VOLUME I

1968

Special Committee

MINISTER OF
NATIONAL HEALTH AND WELFARE



MINISTRE DE LA
SANTÉ NATIONALE ET DU BIEN-ÊTRE SOCIAL

OTTAWA

November 14, 1968.

Dear Senator Lamontagne:

In response to your invitation of February 21, 1968, we take pleasure in submitting to you and the members of your Committee our Brief entitled "Department of National Health and Welfare, Brief to the Special Senate Committee on Science Policy".

In its preparation, the Ad Hoc Steering Committee on Scientific Policy of our Department attempted to adhere in format and substance to the Guidelines of July 26, 1968, provided by your Directors of Research.

We trust that our submission will be helpful to you in your deliberations of the complex and timely issue of a Science Policy for Canada.

Respectfully submitted,


John Munro

The Honourable Senator Maurice Lamontagne,
Chairman,
Senate Committee on Scientific Policy,
The Senate,
Ottawa,
Ontario.

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5.

INTRODUCTION

The following Brief is the result of a departmental study undertaken for the purpose of accumulating and presenting evidence to the Special Committee on Science Policy.

PART ONE includes a description of the organization, responsibilities and functions of the Department and discusses the organization and management of departmental scientific activities. It deals also with the regional scientific activities related to departmental programs in Canada and describes coordinating mechanisms in current use.

PART TWO represents the output of scientific and technical activities of the Department during the last five years. Issued as a separate volume, it contains patents, reports, conferences, projects completed and current, and selected case histories.

Expenditures while considered part of Output, are found in Section 14.

PART THREE deals with problem areas related to scientific activities. This part of the Brief includes a wide variety of problems due to a change in physical and social environments and indicates needed areas of research. Departmental plans and programs are also described therein.

Finally, PART FOUR deals with national science policy and ends with final conclusions for the entire work.

Because of limited resources and time, and the range of specialized topics and details entailed, despite care, meticulous editing was not possible and we regret any errata or inaccuracies which may appear in this volume.

R E C O M M E N D A T I O N S

RECOMMENDATIONS

1. Long-term and Adequate Support for Departmental Scientific Activities

We recommend:

that the scientific activities of the Department be maintained

(1) at a level to enable them to meet demands arising out of growing population, social change and physical changes;

(2) to permit and encourage flexibility to alter programs in response to changing requirements.

2. Training and Research into Scientific Administration

We recommend that:

intensification of training and research into scientific administration and the concomitant development of capabilities in Canada for organizational studies to systematically assess the abilities of our institutions to carry out the goals established for a science policy.

3. Application to Canadian Requirements of the O.E.C.D. Proposed Standard Practice for Surveys of Research and Development - 3rd Revision

We recommend that:

the Science Council of Canada, in consultation with science-based agencies, universities, industry, review, update and apply to Canadian requirements the O.E.C.D. Proposed Standard Practice for Surveys of Research and Development, 3rd Revision. These could then be adapted in cooperation with O.E.D.D. for Canada's participation in international comparative studies.

4. Statement of National Science Policy for Canada

We recommend:

that a statement of national science policy

(1) define national objectives explicitly; and

(2) identify required resources, desirable activities and allocate responsibilities to agencies best able to implement the elements of this policy.

5. Science Policy, Education and Manpower Training

We recommend:

the early application of systems analysis to our educational systems in Canada taking into accounts

- (1) present and future requirements of the economy for trained personnel;*
- (2) of the society for an educated population; and of*
- (3) individuals themselves for the greater enrichment and satisfaction from life which an advanced technological society should be able to provide its citizens.*

These three requirements of an educational system are not always compatible and may be expected to create and reveal conflicts regarding the allocation of resources. Nevertheless, a careful examination of the relevant factors is crucial now in considering the demands for high quality education and costs of continuing education. The quality, content and atmosphere of elementary and particularly secondary education and the quality of our teachers and institutions are also relevant.

6. Recommendations on Scientific and Technical Information¹

We recommend:

that a nationwide information network for the orderly development of scientific and technical information be established as soon as feasible in Canada.

That a government clearinghouse capability be established to handle information regarding currently planned and active research and development efforts. All Federal agencies supporting research and development should be directed to

(a) maintain comprehensive, up-to-date indexes of their own current research and development efforts, and

¹ Scientific and Technical Communication in the Government U.S. Department of Commerce. 48474

(b) provide prompt and appropriate information about those efforts to the clearinghouse for correlation and authorized dissemination.

That a government-wide clearinghouse capability be established for documents reporting the results of research and development supported by the Federal Government and Crown Agencies.

That a government-wide clearinghouse capability for retrospective search and retrieval services of federally-supported, organized collections of scientific and technological information be established.

That a government-wide clearinghouse capability for coordinated access to federally-supported specialized information centres and services be established when feasible.

That the jurisdiction of these government-wide clearinghouses be extended to and include academic institutions and industries if and when feasible at a later date.

7. Parliamentary Committee on Science Policy

A one-time thorough investigation such as a Royal Commission or Senate Committee is certainly of value. Much research is accomplished in an atmosphere of urgency and definite recommendations are made to Government. But there is never a guarantee that the information generated will be kept up-to-date and there is seldom (nor is it desirable) that there should be a second full fledged inquiry.

We recommend:

that out of this special committee of the Senate on Science Policy, continuity be achieved through a Parliamentary Committee. This would provide an opportunity for either continuing or periodic review and assessment of the kind required.

It could, for example, publish periodical reports on special aspects of science. These would be sufficiently different from Reports issued by the Science Council reflecting broader contact with the general public and various organized groups within Canada and abroad and not only the expert opinion which is expected from a Council of learned men.

8. Re National Health Survey

In view of the fact that we have no reliable estimates in Canada of the prevalence of our chronic diseases and disabilities; in view of our inadequate information of the economics of health care in Canada and in view of the fact that the findings of the 1950-51 Canada's Sickness Survey are still being projected for a vastly changed population, we recommend the establishment of an ongoing Canada Health Survey.

We recommend:

that our Department, together with the Dominion Bureau of Statistics should be encouraged and given the resources to undertake this urgent responsibility as we approach the 1971 Census of Canada.

9. Social and Behaviourial Sciences and Science Policy¹

We strongly endorse the position taken by the Economic Council of Canada that a great many of Canada's most perplexing problems require extensive cooperation between the social and natural sciences and that it is essential that any policy for science in Canada be conceived broadly enough to encompass an appropriate development of the social sciences and humanities along with the natural sciences.

1 See also - Economic Council of Canada, Fifth Report, p. 52-53

American Psychologist 22:11 Special issue;
"Congress and Social Medicine"

We recommend that:

the Science Council of Canada include in its membership adequate representation from the social and behavioural sciences.

We recommend that:

appropriate measures be taken to achieve effective coordination in applied social research of the various government departments to result in a broader and more balanced approach for the development of all social programs under the jurisdiction of the Government of Canada.

10. International Science Policy

We recommend:

that a clearinghouse containing data and case studies on Canada's international scientific activities be established by a central agency concerned with the overall planning and coordination of scientific and technical activities in international commitments.

11. Support to fundamental research

We believe that adequate and continuing support should be provided for fundamental research for the following reasons:

- (1) fundamental research is the chief source of increased scientific knowledge which provides the necessary foundation for applied research and technology;¹
- (2) It conditions the educational system, not only by creating a reservoir of highly skilled manpower but also by contributing to the vitality of the educational process;²
- (3) Fundamental research is at the same time bound up with the general development process of science and technology, itself connected with economic growth and social progress of society.³

1, 2 and 3 Organization for Economic Cooperation and Development, Paris 1968 (1st Revision)

We consider health and welfare activities as resources and we believe that support to basic research leading to the generation of new knowledge and innovation in these fields constitute a form of long-term investment which is likely to contribute significantly to the socio-economic developments of Canada.

- (4) it is also noted that applied research multiplies the problems of interpretation and explanatory knowledge which can only be solved by more fundamental research. The result is that fundamental research no longer aims, as it used to do, exclusively at the advancement of pure knowledge, but is increasingly called upon to meet the needs which arise at the level of applied research and development.¹

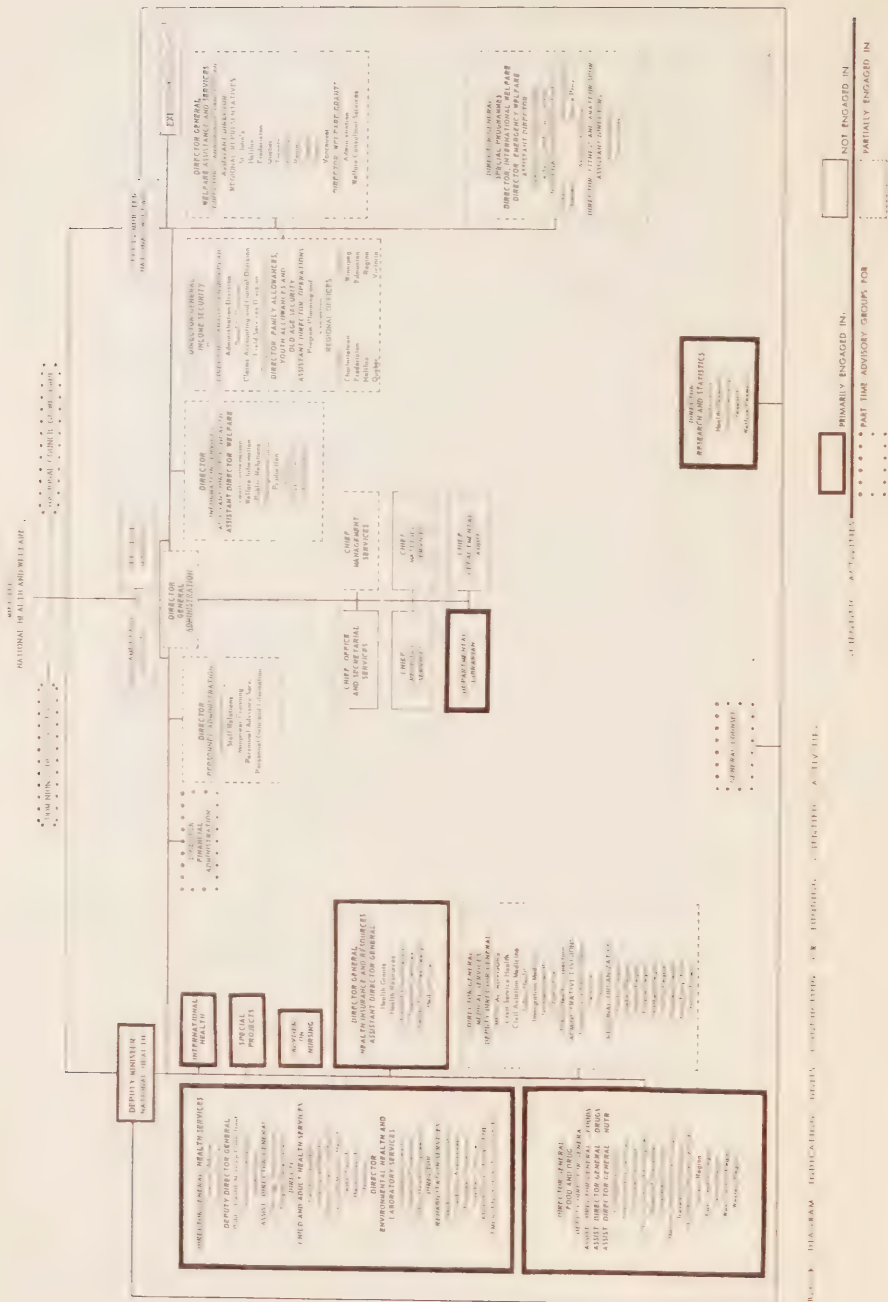
As already indicated earlier in this Brief, our Department is mission-oriented and the bulk of our research activities is of an applied nature. As the need arises between 8% to 10% of the time of our scientists may be devoted to fundamental research in order to obtain the fundamental information required for the solution of practical problems.

Therefore, we recommend that:

- (1) adequate support to fundamental research be provided to universities and other appropriate agencies to stimulate and promote scientific growth;*
- (2) support be provided for fundamental research needed to solve departmental scientific problems;*
- (3) within the framework of the nation's scientific goal, support be granted for fundamental research on the basis of its quality and its educational value.*

¹ Organization for Economic Cooperation and Development, Paris 1968, (1st Revision)

DEPARTMENT OF NATIONAL HEALTH AND WELFARE



PART ONE

ORGANIZATION AND
RESPONSIBILITIES FOR SCIENTIFIC ACTIVITIES

7. GENERAL DESCRIPTION OF THE DEPARTMENT OF
NATIONAL HEALTH AND WELFARE

The Department of National Health and Welfare is the chief federal agency in health, welfare and social security matters.

7.1 Authority

Authority for the establishment of the present department is provided for by the Department of National Health and Welfare Act, Section 5 which stipulates

"The duties, powers and functions of the Minister shall extend to and include all matters relating to the promotion or preservation of the health, social security and social welfare of the people of Canada over which the Parliament of Canada has jurisdiction ..."

7.2 Departmental Functions and Responsibilities

These include research into human health and welfare; the collection, publication and distribution of information relating to public health; medical care of immigrants and seamen and the administration of marine hospitals; the supervision as regards the public health of railways, ships and other methods of transportation; Indian and Northern health services; the enforcement, so far as they relate to public health, of rules or regulations made by the International Joint Commission; the administration of the Food and Drugs and Proprietary or Patent Medicine Acts, the Narcotic Control Act, the Quarantine Act, the Public Works Health Act, the Leprosy Act, the Family Allowances Act, the Old Age Security Act, regulations under these Acts, and the Canada Pension Plan.

An important function of the Department is the provision of consultant and advisory services to the provinces and national voluntary agencies in health and welfare fields and cooperation with the provinces in the development and financial support of programs for the improvement and preservation of human health and to provide for the social security and welfare of the people of Canada. Examples of such cooperation and support are provided by the National Health Grants Program, the Welfare Grants Program, the Fitness and Amateur Sport Program, the Hospital Insurance and Diagnostic Services Program, the Health Resources Fund, the Medical

Care Program, the Disabled and Blind Persons' Allowances, the Public Health reference laboratory services of the Laboratory of Hygiene, Emergency Health and Welfare Programs, and the prosthetic services made available through the Department's Rehabilitation Services Program.

Cooperation is extended also to other Departments and agencies of the federal government and to national voluntary and professional organizations in the health and welfare field. The Radiation Protection Division, for example, is the principal health and safety adviser to the Atomic Energy Control Board.

Departmental Organization

The activities of the Department have been grouped into three organizations, namely the health organization under the executive authority of the Deputy Minister of Health; the welfare organization under the executive authority of the Deputy Minister of Welfare. The Administration Branch, Research and Statistics Directorate and General Counsel fall directly under the authority of the two Deputy Ministers.

The Department is headed by a Minister who is responsible for the overall administration and management of the Department.

The Department operates more than 260 units including hospitals, clinics, nursing stations, health units, health stations, medical laboratories and medical welfare offices throughout Canada and overseas.

All these are linked by Telex.

At the present time, the Department employs more than 7,500 people and the estimates for the fiscal year 1968-69 total 3.6 billion.

8. DEPARTMENTAL RESPONSIBILITIES FOR SCIENTIFIC ACTIVITIES

8.1 Introduction

Section 5 of the Departmental Act assigns to the Minister the duties, powers and functions extending to and including all matters relating to the promotion or preservation of the health, social security and social welfare of the people of Canada over which the Parliament of Canada has jurisdiction and particularly includes

- (a) the administration of such Acts of the Parliament of Canada and of Orders and Regulations of the Government of Canada which are not by law assigned to any other Department or any Minister thereof relating in any way to the health, social security and welfare of the people of Canada; and
- (b) investigation and research into public health and welfare.

8.1.1 Research

Pursuant to the foregoing the Department is responsible for the administration of a number of statutes which can be said to relate to scientific activities including research aspects thereof. Authority for the establishment and maintenance of units of the Department concerned with scientific activities is described in detail in relevant sections of the Brief.

In particular, the Minister is responsible for the administration of a number of Statutes in respect of which some aspects of scientific research may be conducted and these are as follows:

Welfare - Old Age Security Act, the Canada Pension Plan, the Family Allowances Act, the Blind Persons Act, the Disabled Persons Act, the Old Age Assistance Act, the Unemployment Assistance Act, the Canada Assistance Plan and the Fitness and Amateur Sport Act.

Health - The Food and Drugs Act, the Proprietary or Patent Medicine Act, the Narcotic Control Act, the Hospital Insurance and Diagnostic Services Act, the Medical Care Insurance Act, the Health Resources Fund, and the Public Works Health Act.

The Minister is, moreover, responsible for the supervision as regards the public health of railways, boats, ships and all other methods of transportation. This involves establishing standards for potable water on common carriers, as well as sanitary standards in certain transportation premises as, for example, railways and airports. The Minister is also responsible for the enforcement of any rules and regulations made by the International Joint Commission promulgated pursuant to treaty between the United States of Canada, insofar as they relate to public health.

Pursuant to the above responsibilities, the Department is responsible within the limits of moneys provided, for research both intramural and extramural. This latter is carried out through a number of divisions or agencies within the Department, as, for example, the Food and Drug Laboratories, the Radiation Protection Unit, the Environmental Health Laboratory, the Laboratory of Hygiene and the Virus Laboratory.

8.2

Departmental Responsibilities in the Field of Communications

Communication responsibility is written into the basic legislation under which the Department operates. Section 5(h) of the Department of National Health and Welfare Act states that "subject to the provisions of the Statistics Act, the duties, powers and functions of the Minister include the collection, publication and distribution of information relating to the public health, improved sanitation and social and industrial conditions affecting the health and lives of the people".

In that same section, provision has also been made for the Minister of National Health and Welfare to "cooperate with

provincial authorities with a view to the coordination of efforts made or proposed for preserving and improving the public health and providing for the social security and welfare of the people of Canada".

8.3

Manpower Training

The legal basis for the training or financial assistance towards the training of scientists and technicians is provided for in a number of Statutes and Orders-in-Council such as:

- (1) The General Grants Rules, governing the administration of the Health Grants (Under the Professional Training Grant)
- (2) The Health Resources Act
- (3) The Public Service Act

8.4

Standards

There is also legal provision for the establishment and maintenance of standards in several Statutes and Orders-in-Council administered in the Department, such as

- (1) The Food and Drugs Act
- (2) The Proprietary or Patent Medicine Act
- (3) The Hospital Insurance and Diagnostic Services Act
- (4) The Medical Care Act
- (5) Health Resources Act

The above reference is not exhaustive and reference to the legal basis for the scientific activities performed by scientific divisions of the Department will be made under the relevant sections of this Brief.

8.5

Statutory Basis for Departmental Statistical Services

Authority for the departmental statistical service is specifically provided in the Department of National Health and Welfare Act which assigns responsibility for:

5. (b) investigation and research into public health and welfare; and

5. (h) subject to the provisions of the Statistics Act,
the collection, publication and distribution of
information relating to the public health, improved
sanitation and social and industrial conditions
affecting the health and lives of the people;

In exercising these responsibilities, the Department established its Research and Statistics Division in 1945, which for the last 23 years has acted as the principal federal agency for socio-economic research in the fields of health, welfare and social security, and has provided a statistical service for the Department.

Other acts administered by the Department make specific reference to the statistical data required by the Minister for the proper administration of the statutory programs. The Department requires detailed statistical information in order to evaluate and report on these departmental programs.

The departmental authority is of course circumscribed by the provisions of the Statistics Act, which allocates the major responsibility for routine data collection to the Bureau of Statistics. The Department therefore makes a distinction between the specialized information it needs to fulfil its responsibilities, and the comprehensive statistics on the health and welfare of the people that can be more effectively gathered through the Dominion Bureau of Statistics facilities. The statistical research of the Department is problem-oriented or program-oriented. The Department conducts research to find answers to problems in the fields of health, welfare and social security. It conducts research to evaluate the effectiveness of its programs in these fields, and to enable it to plan new programs. Naturally, in the conduct of research in sociological, economic, epidemiological, and administrative questions, the tools used are frequently statistical

tools, and the observations made are statistical observations. In exercising its statutory responsibility, therefore, the Department is careful to distinguish between the application of statistical methods to diverse problems on the one hand and the routine collection and analysis of data for the publication of annual statistical series, where the Dominion Bureau of Statistics has a primary role to play.

8.6. DEPARTMENTAL SCIENCE POLICY

8.6.1 Definition

The science policy of our Department is the broad strategy for the use of science by our scientifically qualified personnel and support staff in carrying out departmental goals. Viable policy for the use of science in the attainment of goals for the health and welfare of Canadians must take into account several distinctly Canadian features: our federal constitutional structure, our cultural mosaic with its two dominant themes and a large variety of sub-themes and heritages. It is also influenced by our membership in the North American society, our climate, and our vast geographic expanse. And last but not least, our special demographic features namely, one-quarter of our population living and working in two giant modern industrial conurbations, some 70 percent concentrated in the St. Lawrence Basin area and another two-thirds of our population divided among some two thousand cities, towns and villages with the balance of Canadians, including our indigenous peoples, scattered in many sparsely settled areas or former towns and villages suffering depopulation due to the accelerated rate of internal migration to centres of opportunity. Moreover, science policy is one component of a complex of government policies including foreign policy.

8.6.2 Constitutional aspects

It is important to recall the frame of reference within which the Department of National Health and Welfare operates in order to establish the areas which do in fact fall within the Minister's responsibility, as already mentioned in this Brief.

In the Department of National Health and Welfare Act of 1944-45, the Minister was given responsibility for "all matters relating to the promotion or preservation of the health, social security and social welfare of the people of Canada over which the Parliament of Canada has jurisdiction". Subsequent Acts have broadened this responsibility or made it more specific as regards areas of particular concern like health insurance, pensions,

Special Committee

amateur sports, and so on.

To comprehend the scope of this responsibility, it is helpful to recall the definition of health used by the World Health Organization of which Canada is a member:

"Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".

The WHO goes on to affirm that:

"Governments have a responsibility for the health of their peoples which can be fulfilled only by the provision of adequate health and social measures".

Social welfare was most recently defined by the Group of Experts appointed by the U.N. Secretary-General to study the organization and administration of social welfare programs, meeting in Geneva in August 1967, as follows:

"social welfare ... is regarded as a body of activities designed to enable individuals, families, groups, and communities to cope with the social problems of changing conditions. But ... social welfare has a further function within the broad area of a country's social development. In this larger sense, social welfare should play a major part in ensuring that the human and material resources of the country are effectively mobilized and deployed, to deal successfully with the social requirements of change and thus contribute to nation building".

This definition is broad enough to include the concept of social security, which is one method by which communities may cope with the social problems of changing conditions.

Anything therefore, which promotes or safeguards the "complete physical, mental and social well-being" of the Canadian people may be regarded as falling within the responsibility of the

Minister of National Health and Welfare. Anything which promotes or safeguards the ability of "individuals, families, or communities to cope with the social problems of changing conditions", or which contributes to "the effective mobilization and deployment of our human and material resources to deal with the social requirements of change", may also be thought to fall within the responsibility of the Minister of National Health and Welfare. In both cases, however, it must be borne in mind that his responsibility extends only to those matters over which the Parliament of Canada has jurisdiction.

There are some matters over which the Parliament of Canada has unquestionable jurisdiction, such as quarantine, marine hospitals, marriage and divorce, unemployment insurance, old age pensions and supplementary benefits, and the regulation of commerce in narcotics and other pharmaceutical products. On the other hand, the provincial legislatures clearly have jurisdiction over the establishment, maintenance and management of hospitals and welfare institutions, and of the administration of justice, and have concurrent jurisdiction over old age pensions and supplementary benefits. In addition to these powers allocated by the constitution, the provinces are generally assumed to have primary responsibility for the health and welfare of their residents, while the federal government has exercised responsibility in questions of food and drugs legislation, proprietary and patent medicine, leprosy, fitness and amateur sport, family allowances, the health of Indians and Eskimos, and so on. In this regard, it is important to note a specific responsibility assigned to the Minister by the National Health and Welfare Act, section 5(1):

"Co-operation with provincial authorities with a view to the co-ordination of efforts made or proposed for preserving and improving the public health and providing for the social security and welfare of the people of Canada".

From this clause it can be seen that a key responsibility of the Minister is to show leadership in seeking solutions to many current health and welfare problems, and to co-ordinate efforts designed to give effect to such solutions, even though such efforts will require the full co-operation of the provincial governments to become effective.

8.6.3

Formation and establishment of Science policy

Within the broad framework which has just been referred policy science formation may originate from the Minister who has the final responsibility for the establishment and the effective working of all departmental policies.

Originated policy may also emanate from practically all levels of management. In practice, policy formulation is often initiated by scientific personnel, reviewed by scientific managers and senior executives of the Department and they are finally submitted to the Minister for his consideration and approval.

8.6.4

Major Role Fulfilled by the Dominion Council of Health Towards the Establishment of Science Policy of the Department

The Dominion Council of Health is the principal advisory body to the Minister on matters relating to the health of the people of Canada and fulfills a substantial role towards the formulation and establishment of departmental science policy, (A detailed Description of Council's organization, functions and responsibilities, appears in Section 11.2.4 of this Brief.)

The Council, with the Deputy Minister of National Health as Chairman and the Deputy Ministers of Health of each of the ten provinces and five appointees of the Governor-in-Council representing major segments of the population has been providing very valuable advice to the minister on science policy. It's composition has made it possible over the years to quickly assess such factors as the availability of resources, both financial and material, including research facilities and scientific personnel for the accomplishment of tasks deemed

necessary in the light of existing intelligence on the state of health of Canadians and thus for example the National Health Program inaugurated in 1948 to provide grants to the provinces for the development of health services in a number of fields with an annual appropriation at that time of \$35 million recognized the need of baseline information on the health of Canadians before specific programs were undertaken.

In 1950 a National Sickness Survey, the first of its kind ever attempted, was carried out individually by each province and financed through the National Health Program according to a uniform pattern and procedure to assure comparability between provinces.

8.6.5

Policy Administration

Our science policies converge to include:

1. Strategies for having the most up-to-date intelligence through our expert consultants and technical and advisory committees on the most recent developments in the fields of health and welfare in Canada as well as throughout the world.
2. Programs for the carrying out of intramural research to extend the boundaries of knowledge and the application of techniques for the conquest and control of disease and disabilities and the promotion of the health and the well-being of Canadians and mankind if possible.
3. The funding and support of extramural research projects in both health and welfare, training of personnel, financial assistance through hospital construction grants as well as assistance in hospital design, assistance with laboratory and radiological services, with venereal diseases control through general public health grants, tuberculosis control grants, mental health grants, cancer control grants, public health research grants, medical rehabilitation and crippled children grants, and child and maternal health grants.

4. The development of standards in terminology, processes, techniques of care and the initiation of field trials and demonstrations of new and previously untried procedures and products, as well as programs in the organization of medical care such as for example organized home care plans.

Included in our policy considerations are the continuous assessment of current problems and the redeployment of resources of personnel, equipment and financial resources to meet new challenges in the promotion of health and well-being of Canadians. Among these must be mentioned the problems of:

1. Poverty
2. Changing patterns of morbidity and mortality
3. Environmental pollution, and
4. Regional disparities in the attainment of health and well-being.

These are discussed at some length in Part Three of this Brief.

9 SCIENTIFIC ACTIVITIES OF THE DEPARTMENT OF NATIONAL HEALTH
AND WELFARE

9.1 Basically, the Department of National Health and Welfare is scientifically oriented. In their day-to-day work, the various units of the Department make continuing use of disciplines falling within the broad spectrum of the physical, but mainly life and social sciences.

In the area of physical sciences, departmental staff is interested in mathematics (statistics), physics, chemistry and some of the earth (geology, hydrology, meteorology), space (aerospace medicine) and engineering sciences (chemistry, physics, and electronics).

In the area of life sciences, the department is concerned with the use of biological, medical, social as well as some of the agricultural sciences. In the health field, it is particularly concerned with the use of the biosciences namely microbiology, biochemistry and applied health sciences, namely public health, medicine, dentistry, pharmacy nutrition and veterinary medicine.

In actual practice, the health sciences which are used are those required for the education, practice and research of the health professions. These are listed in Volume 1, 1964, Chapter 7, pages 237-295 of the Royal Commission on Health Services Report, as: required for the education, practice and research of the various health professions. These are listed in Volume 1, 1964, Chapter 7, pages 237-295 of the Royal Commission on Health Services Report as:

- Medical profession
- dental profession
- nursing profession
- paramedical professions
- pharmaceutical profession
- optometric profession

The Royal Commission further describes "selected professional, technical and other health personnel" in their Report, Volume II, 1965, pages 39-40 as: "Among the occupations that have been described as part of the paramedical group are:

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Hospital Administrators
 Psychologists - Clinical
 Dietitians
 Medical Librarians
 Medical Record Librarians
 Public Health Inspectors
 Sanitary Engineers
 Medical Technicians - Laboratory
 Radiological
 Operating room
 Electroencephalography
 Electrocardiography
 Orthoptists
 Prosthetics and Orthotists
 Therapists - Physio
 Occupational
 Speech and Audiological
 Medical - Artists
 Illustrators
 Photographers
 Medical Social Workers

9.1.1 Health science subjects as such fall in the undernoted categories
 of the Library of Congress Classification which is used by the
 Department:

QM - Anatomy
 QP - Physiology
 QR - Bacteriology
 R - Medicine (general)
 RA - Public aspects of medicine: Medicine and the
 state, public health, etc.
 RB - Pathology
 RC - Internal medicine. Practice of medicine
 RD - Surgery
 RE - Ophthalmology
 RF - Otorhinolaryngology

- RG - Gynecology and obstetrics
- RJ - Pediatrics
- RK - Dentistry
- RM - Therapeutics. Pharmacology
- RS - Pharmacy and materia medica
- RT - Nursing
- RV - Botanic, Thomsonian and electric medicine
- RX - Homeopathy
- RZ - Other systems of medicine
- HV - Special pathology
- Part of H - Social sciences (general)
- Part of HA - Statistics
 - HD - Economic history (e.g., labour-social conditioning, rehabilitation of disabled, industrial health)
 - HC - Finance (e.g., Health Insurance)
 - HN - Social history and conditions
 - HQ - Social groups
 - HT - Communities, classes races
 - S - Agriculture
 - SB - Plant culture
 - SF - Animal culture (includes veterinary medicine)
 - SH - Fish culture

Finally, in the area of social sciences, the department is also using several broad groups of disciplines such as economics, political science, social psychology, sociology and social statistics. These are used especially for the administration of the welfare programmes of the department.

The degree of involvement of the various units of the Department in scientific activities is shown in the attached organization chart.

9.2

Description of Scientific activities of the Department

Scientific activities performed or sponsored by the Department include scientific research, the transfer of scientific and tech-

nical information, the training of scientific manpower, the use of statistics for research and planning purposes and the establishment and maintenance of standards.

9.2.1 Scientific Research

The Department of National Health and Welfare supports health and welfare research in a broad sense, both intramurally and extramurally.

9.2.1.1 Intramural Research

Health Research, as supported by the Department of National Health and Welfare, is carried out in departmental laboratories in relation to statutory and other departmental functions (Food and Drugs, Radiation Protection, Microbiology including viruses, Environmental Health).

9.2.1.1.1 Character of Work

Research activities carried out in the Department is problem oriented and is chiefly of an applied nature. It is directed towards identifying and evaluating the feasibility and practicability of new concepts, techniques or material.

The amount of basic research performed is relatively small.

9.2.1.1.2 Financial Aspects

All departmental laboratories which have statutory functions, as well as many technical divisions, carry out research related to their specific functions. Departmental divisions involved and the funds devoted to research for 1966-67 and 1967-68 are as follows:

	Actual	Estimated
<u>Health Organization</u>	<u>1966-67</u>	<u>1967-68</u>
Food and Drug Branch	1,632,000	2,947,000
Medical Services Branch	177,000	188,000
Hospital Insurance & Resources Branch	118,200	271,600
<u>Health Services Branch</u>		
Emergency Health Services	3,800	9,500
Laboratory of Hygiene	435,800	466,900
Occupational Health	474,500	527,300
Radiation Protection	477,000	602,000
Nutrition	20,000	—
Public Health Engineering	13,000	132,000
Epidemiology	74,500	82,000
Dental Health	17,000	20,000
Medical Rehabilitation	31,000	47,000
Smoking and Health	3,000	3,000
Total Health Organization	3,476,800	5,296,300

	Actual <u>1966-67</u>	Estimated <u>1967-68</u>
<u>Administration Branch</u>		
Research and Statistics Division	552,000	576,000
Library	<u>106,000</u>	<u>120,000</u>
Total Administration Branch	658,000	696,000

9.2.1.2

Extramural Research

In addition to research done by the Department's own staff as previously described, research may be assisted under two acts and two programs: (1) The Public Health Research Grant, (2) The Hospital Insurance and Diagnostic Service Act, (3) The Fitness and Amateur Sport Act and (4) under Welfare Grants. Extramural research is also conducted by clinical investigators under contract for the Food and Drug Directorate. In general, such research may be carried out in Health Units, Hospitals, Universities, or the offices of private practitioners with the specified purpose of "alleviating burdensome diseases and disabilities".

Support is also given to Operational Research which systematically seeks facts which when implemented will help to improve the effectiveness and efficiency of health services.

9.2.1.3

Public Health Research

In public health research there is an interest in what benefits will accrue to large numbers of people. Public Health Research is assisted under the National Health Grants Programs. It is concerned with adding to knowledge which will "assist in the promotion and preservation of health", and has practical application:-

- in diseases of particular public health significance,
- in preventive programs,
- in public health services for diagnosis, treatment and rehabilitation,
- in epidemiology,
- in hospital activities,
- in the efficient operation of health services.

Research assisted under the Public Health Grants is more likely to be "applied" or "developmental" research although long term fundamental studies related to the health needs and to provincial and federal health services are not precluded if they might increase knowledge relevant to the purpose of the Grant.

A detailed description of this Grant will be found in Section 11.4.2 of this Brief.

9.2.1.2.2 Clinical Research

Clinical research, which may range widely from detailed elucidation of a disease process to the adaptation of a method of treatment, or the intensive study needed of some patients, for their fullest possible diagnosis and treatment; clinical research is permitted under the Hospital Insurance and Diagnostic Services Act.

A more detailed description on this topic will be found in 11.5.3.2 of this Brief, dealing with the activities of the Directorate of Hospital Insurance and Diagnostic Services.

9.2.1.2.3 Research assisted under the National Physical Fitness Act and the Welfare Grants is described in Sections 11.10.3 and 11.9.1 of this Brief.

9.2.1.2.4 Research conducted under contract by clinical investigators for the Food and Drug Directorate is described in Section 11.7.2.1.5 of this Brief.

9.2.2 Scientific and Technical Information Activities

9.2.2.1 The Department of National Health and Welfare includes several organizations concerned with a wide spectrum of scientific and technical information activities.

9.2.2.2 It operates a number of libraries, film libraries, an Information Retrieval Centre, and also acts as a national clearinghouse in certain fields of health. Services to users include loans from collections, the preparation of bibliographies in specialized fields of health, abstracts and answers to scientific inquiries.

9.2.2.3 It is also concerned with the production of scientific and technical information aimed at professional, technical and lay audiences.

9.2.2.4 In addition, under a number of federal-provincial programmes, the Department makes technical and financial assistance available to the provinces and national voluntary agencies on behalf of programmes or projects concerned with scientific and technical information activities.

9.2.2.5 The staff concerned with information activities numbers approximately 188. This, however, does not include the time expended by several professionals who devote part of their time to these activities.

- 9.2.2.6 The total annual operating cost of scientific and technical information activities for the entire Department is currently estimated at \$1.2 million.
- 9.2.2.7 Trends indicate that all these organization activities are increasing in varying degrees but steadily. They are expected to continue to do so during the next five years or so.
- 9.2.2.8 The most important developments are taking place in the Departmental Library which is planning to expand its services considerably and become a part of a new Communications Centre which is in the process of being organized and should be fully operative by 1970.
- 9.2.2.9 This Centre would be the heart of a national health communications system designed to function as a component of a national information network embracing all sciences. The ultimate objective of this Centre will be the development of national system of health and welfare communications, co-ordinated with other parallel systems in the broad field of sciences and capable of providing faster and more specific scientific and technical information services.
- 9.2.2.10 A more detailed description of scientific and technical information activities under the relevant parts of this Brief dealing with the scientific activities of individual units of the Department concerned with scientific and technical information.

9.2.3 Statistics

9.2.3.1 Introduction

The main purpose of the statistical services operated by the Department is to provide management with valid information necessary:

- (a) to discharge its statutory responsibilities relating to the promotion or preservation of the health, social security and social welfare of the people of Canada; and
- (b) to meet its regular obligations through participation in international health and welfare programs.

Statistical services are defined as those activities concerned with the collection, analysis and interpretation of quantitative data, and the application of statistical methods in problem-solving,

in order to meet the Department's responsibilities and obligations. Statistical information is a basic requirement for all phases of the administrative process in the Department. It consists of answers to specific questions obtained through the application of statistical methods, regular reports on program operations indicating degrees of success and failure in achieving program objectives, or the product of a scientific investigation which will be disseminated to those members of the public who can use it to promote or preserve the health and social welfare of our people. It is on this basis that our requirements for internal statistical services are rationalized in the light of the Department's objectives and Departmental Requirements and Functional system used.

9.2.3.2

Because of our diverse requirements for statistical data, it is neither necessary nor desirable to have a completely centralized statistical system. Under certain circumstances the Department required the freedom to collect and analyze and interpret certain kinds of statistics itself. This is exemplified by special studies which involve the application of statistical methods

- (a) to the identification and elucidation of health and welfare needs and problems in respect of disease, personal and social characteristics, and of environmental factors, and
- (b) to add to the planning, implementation, improvement and evaluation of health, welfare and social security services, programmes and facilities in relation to objectives, resources and costs.

The planning and evaluation of major programs in the health, welfare and social security fields are an essential responsibility of the Department. Evaluation entails analyzing provincial programs in these fields, or shared-cost programs like hospital insurance, medical care, and welfare assistance. For this purpose, the statistics needed are obtained from a variety of sources. For the Old Age Security, Family Allowance, Canada Pension and Guaranteed Income Supplement programs, statistical data are available from within the departmental administration. For the Canada Pension Plan con-

tribution statistics, and for physicians, income data for Medical Care Insurance analysis, extensive use is made of the resources of the Department of National Revenue with whom close co-operative arrangements have been made for the collection and processing of data. For the shared-cost programs like Hospital Insurance, Medical Care Insurance, and Canada Assistance Plan, legislative arrangements have been made for monthly, quarterly and annual reporting of socio-economic data on their operations. The provinces report such data to the department on a uniform, standardized basis, and these statistics are passed to the Research and Statistics Directorate for analysis and program evaluation. Departmental statisticians, economists, and sociologists are responsible for consolidating national statistics on the costs and operations of each program for analyzing the caseloads of each program, and for evaluating the services provided, the extent and nature of the protection provided, and the effectiveness of each program in achieving its objectives.

9.2.3.3

Elimination of Duplication

In all these departmental programs, the only one that contains potential elements of duplication with DBS activities is hospital insurance, which requires from provincial administrations annual reports of each hospital's operations, reports similar to those required by DBS for its annual census of institutions. In recognition of this dual interest, DBS representatives have been involved from the outset in the deliberations between the provinces and the department on the development of reporting forms. A joint reporting form has been used since 1959 to serve the needs of both agencies — Departmental needs for program evaluation and reporting to Parliament, and DBS needs for comprehensive national statistics on hospital operations. A joint query system has also been developed for editing these returns.

9.2.4

Testing and Standardization

Our department is extensively involved in testing and standardization in the various operations in the field of public health. Since we are dealing with services rather than products in the main, testing and standardization applies mainly to techniques and procedures.

Special Committee

The Recommended Standards for Maternity and NewBorn Care produced by our Child and Maternal Health Division with a sub-committee of the Maternal and Child Care Advisory Committee as an example. Other units of this Department have actively co-operated with the Specifications and Standards Branch of the Department of Defence Production. Cited below are some specific examples of departmental activities in the development and application of standards.

9.2.4.1

HEALTH SERVICES BRANCH

9.2.4.1.2

Laboratory of Hygiene

The Laboratory of Hygiene has been active in developing standards for certain biologicals such as diphteria toxoid, has assisted organizations such as the American Public Health Association in developing standards i.e. standard methods for studying water, shellfish and has participated in committees of the Specifications and Standards Branch for establishing standards for disinfectants, blood typing products and so forth.

9.2.4.1.3

Occupational Health

The Occupational Health Division has co-operated with the Specifications and standards Branch on the following committees:

1. Committee on Safe Standards for the Dissemination of Toxic Pesticides.
2. A committee on ambient air quality standards for air pollutants.
3. A committee on air quality standards for compressed air used in underwater operations.
4. A committee on safe standards in hospital construction.

Such co-operation has been most effective in instances where no other enabling authority was in existence.

Public Health Engineering

9.2.4.1.4

This Public Health Engineering Division in providing advisory services to other departments in the field of environmental health, has been instrumental in the establishment of guidelines rather than standards that suggest legal authority. Examples of these are:

1. Potable Water Regulations for common carriers.
2. Public Works Health Regulations which are contained in the Sanitary Code that outlines recommended requirements for common carriers in construction camps and eating establishments under federal jurisdiction.

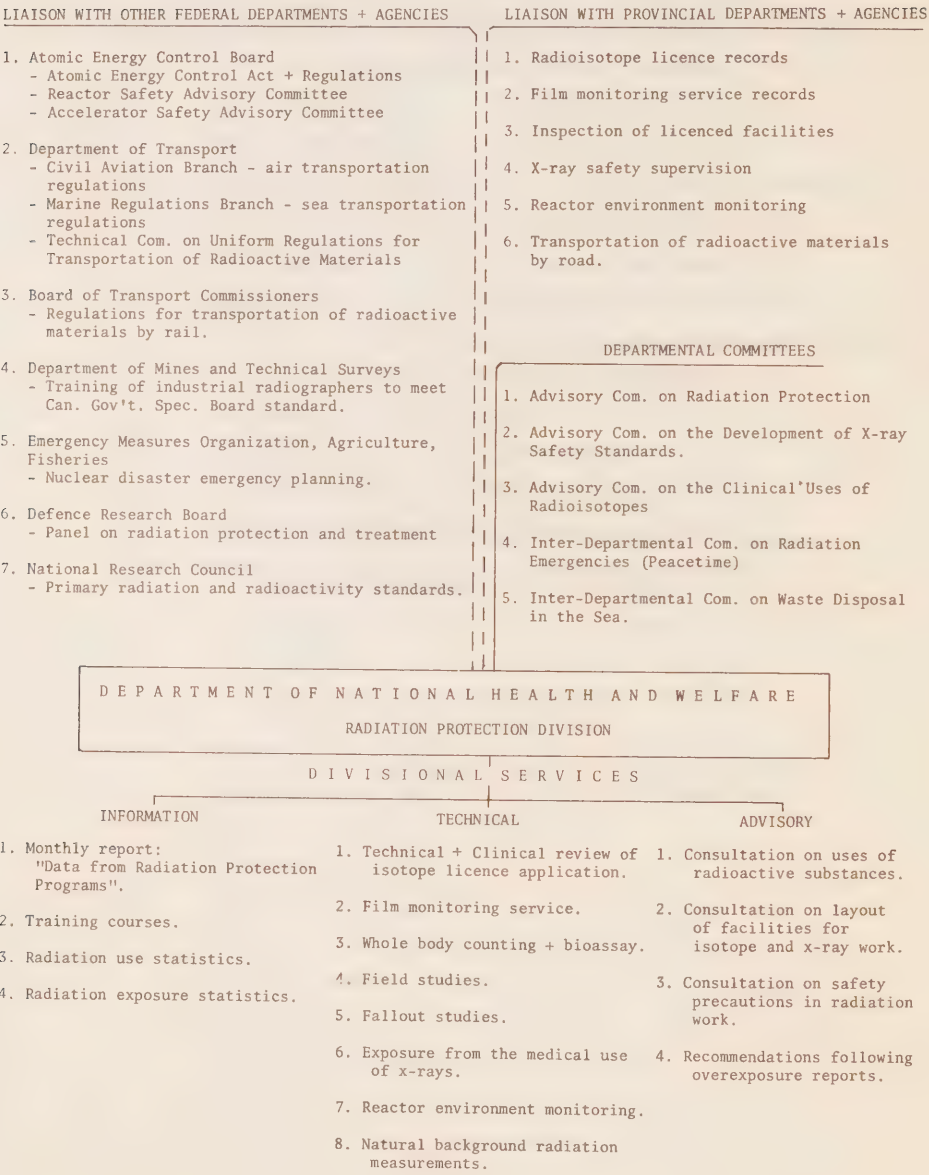
3. Shellfish Control Manual. Through an agreement reached between this Department and the United States Public Health Service in regard to the certification of shellfish intended for export to the United States, this Division has participated through workshops in the development of control procedures which includes:
- (a) The assessment of water quality in shellfish growing areas.
 - (b) Bacteriological and toxicity standards.
 - (c) Frequency of surveys.
 - (d) Prescribed methods of processing, and
 - (e) The development of criteria for engineering assessment of pollution contributions from the surrounding environment.
- Copies of the operation manuals are available.

With respect to guidelines, the Division has over the years, developed recommended standards for:

- 1. Sanitary Code for Common Carriers.
- 2. Eating establishments under federal jurisdiction.
- 3. National standards of raw waters for public water supplies.
- 4. Standards for sulphates in public water supplies.
- 5. Standards for nitrates in public water supplies, and
- 6. Guidelines and objectives for the control and abatement of water pollution for federal facilities.

9.2.4.1.5 Radiation Protection

The involvement of Radiation Protection with other agencies for the development and application of standards regarding study of radiation exposure and radiation protection is best illustrated by the following:



9.2.4.2 HEALTH INSURANCE AND RESOURCES BRANCH

Activities in developing standards have been mainly in the hospital field related to accreditation and includes:
Guide to Hospital Standards - Part I. - Minimum Qualitative Standards submitted by the Working Party on Hospital Standards to the Advisory Committee on Hospital Insurance and Diagnostic Services in April, 1962.

9.2.4.3 FOOD AND DRUG DIRECTORATE

Testing and standardization activities are mainly concentrated within the Food Advisory and Drug Advisory Bureaux. The Technology Division of the Food Advisory Bureau, for example, is primarily concerned with assessment of data on the technology of foods, food additives, pesticides and also provides advice on other technological matters. Currently, they are embarked on a trial analysis for pesticide residue on total diet samples of a family of three for one week. The Standards and Additive Division coordinates and reviews submissions of technical data and provides scientific advice. The Office of international standards deals with international agencies in setting up food standards. The Drug Advisory Service includes, in addition to a division on Medicine and Pharmacology, veterinary medicine, a division concerned with manufacturing and quality control.

9.2.4.4 RESEARCH AND STATISTICS DIRECTORATE

The Research and Statistics Directorate has been engaged in the development of establishing standards, data collection, reporting systems, generally in collaboration with or at the request of other branches of the Departments. An example is the hospital returns.

Testing and Standardization

No actual physical testing or standardization procedures are carried out by the staff of the Research and Statistics Directorate. The use of statistical methods, however, to carry out testing and standardization is strongly developed and applied in a number of different fields, notably - radiation exposure and laboratory standards for vaccines, blood, etc.

For Organization Chart, please refer to
SUMMARY AND RECOMMENDATIONS Section.

10. PERSONNEL ASSOCIATED WITH SCIENTIFIC ACTIVITIES, ANALYSIS
AND POLICIES.

10.1 General Comments

Identification of the reporting organizations for purposes of the Special Committee on Science Policy questionnaire was provided by the departmental coordinator of the Senate Special Committee project to the Personnel Administration Directorate which, on request, undertook the task of obtaining and collating the data required with respect to personnel associated with scientific activities.

Each program officer responsible for providing the Personnel Administration Directorate with the required information was provided with the questions asked in Part II.2.5 of the Senate Special Committee on Science Policy Guideline and with sufficient personnel questionnaires to enable him to obtain the tabulated information regarding his professional staff required in respect of Part II.2.5.c).i) to vi) and Part II.2.5.f).i) to iv), which information either was not available or could not be retrieved from Departmental records in the time available to complete the project. In addition, each responsible program officer was provided with definitions 1 to 1.5 and 4 of Appendix B. to the Senate Special Committee on Science Policy Guideline.

The following statistics therefore, while compiled by the Personnel Administration Directorate, reflect information supplied by program managers or their subordinate officers to whom they delegated the responsibility.

10.1.1 PERSONNEL ESTABLISHMENT AND PERSONS ON STRENGTH BY REPORTING UNIT AND CATEGORY, SEPTEMBER 1968.

BRANCH/DIVISION IDENTIFICATION	Personnel Establishment by Category of Personnel								People on Strength by Category of Personnel									
	Executive	Scientific & Professional	Technical	Admin. Support	Admin. & Foreign Ser.	Casuals	Operational	Prevailing Rate	Post Doctorate	Executive	Scientific & Professional	Technical	Admin. Support	Admin. & Foreign Ser.	Casuals	Operational	Prevailing Rate	Post Doctorate
Fitness & Amateur Sport Directorate	2	4								2	4							
Welfare Assistance & Services Branch (Includes Welfare Grants, and Director General's Office)	3	16	-	45	23					3	7	-	31	16				
Research and Statistics Directorate		47		40							37	36						
Department Library		8		16	1						4	11		1				
Information Services Division		19	13	16							18	13	16					
Food and Drug Directorate	8	518	139	268	29	30	42			2	406	143	299	42	30	57		
Health Services Branch:																		
Lab. of Hygiene		45	58	15		7	25	26	1		41	55	13				26	1
Occupational Health		30	23	13		2	4				28	17	13	2		7	4	
Radiation Protection		22	41	28	1		2				21	40	25	1		2		
Nutrition		4	4								4	6						
Epidemiology		4	4	7							4	6	6					
Dental Health		4	4	3							4	27	17					
Public Health Engineering		50	27	17		10					50	27	17		10			
Mental Health	1	5	1							1	3	-						
Rehabilitation Services		2	5								3	1	3					
Child and Maternal Health		3	1	5							3	1	5					
Research Development		2	3	3							2	3	3					
Health Insurance & Resources Branch	7	21	4	38	13	1				7	21	3	31	10	1			
Department Totals by Category of Personnel	21	804	316	514	69	48	73	26	15	650	302	393	72	48	88	26	1	

10.1.2	Number of professional staff devoting most of their time to administrative duties.	
	Fitness and Amateur Sport Directorate	2
	Welfare Assistance and Services Branch	5
	Research and Statistics Directorate	2
	Department Library	0
	Information Services Division	1
	Food and Drug Directorate	Not Available
	Health Services Branch	
	Laboratory of Hygiene	2
	Occupational Health	4
	Radiation Protection	1
	Nutrition Division	1
	Epidemiology Division	1
	Dental Health Division	3
	Public Health Engineering	11
	Mental Health Division	1
	Rehabilitation Services	0
	Child and Maternal Health	1
	Research Development Division	<u>2</u> 27
	Health Insurance and Resources Branch	<u>5</u>
	Departmental Total (excluding Food and Drug Directorate)	42

10.1.3 (a) Identification by degree category of (i) Country of Birth;
(ii) country in which secondary education taken; (iii) country
in which university degree taken.

Name of Country	Country of Birth by Degree Category			Country of Second- ary Education by Degree Category			Country in which Degree Obtained by Degree Category		
	BACH.	MASTER	DOCTOR	BACH.	MASTER	DOCTOR	BACH.	MASTER	DOCTOR
Argentina			1			1			2
Australia			1			2			1
Austria									1
Canada	124	63	82	127	86	98	133	72	92
China	2	1	2	2	1	2			
Czechoslovakia			1			1			
France									3
Germany		4	3	1	4	3	2	1	2
Greece			1						
Haiti			1			1			
Hungary			5			4			1
India	2	8	17	2	7	17	1	1	9
Ireland			2			2			2
Israel				1				1	
Italy						1			
Japan			2			2			1
Lebanon			1						
Malaysia		1							
Netherlands	4	1	1	3	1	1	1		
Philippines	1		2	1		2	1		1
Poland	4	1	3	1	1	2		2	1
Portugal	1								
South Africa		2	1		1	1			
Tanzania					1				
Thailand			1			1			
Trinidad-Tobago	2		3	2		2			
Union of Soviet Socialist Republic							1		
United Arab Republic	1		2	1		1	1		1
United Kingdom	9	12	18	9	9	18	11	9	23
United States		1	4		5		1	30	20
Yugoslavia	1	1	2			2			2

430 individuals possess a total of 772 degrees

(b) (1) Average number of working years since graduation

	<u>Average</u>	<u>Range</u>
1) Bachelor	12.6 years	1 - 40 years
2) Master	15.5 "	1 - 39 "
3) Doctor	12.8 "	1 - 40 "
4) All degree categories combined	13.4 "	1 - 40 "

(11) Average number of years employed in present organization

	<u>Average</u>	<u>Range</u>
1) Bachelor	9.2 years	1 - 40 years
2) Master	7.1 "	1 - 28 "
3) Doctor	6.5 "	1 - 29 "
4) All degree categories combined	7.6 "	1 - 40 "

(c) Average age of professionals

	<u>Average</u>	<u>Range</u>
1) Bachelor	40	22 - 64
2) Master	41	23 - 65
3) Doctor	43	24 - 62
4) All degree categories combined	41	22 - 65

(d) Percentage of professionals able to operate effectively in Canada's two official languages (by highest degree obtained)

1) Bachelor	31% = $\frac{47}{\text{number bilingual}}$ out of $\frac{151}{\text{total}}$
2) Master	26% = 30 out of 114
3) Doctor	32% = 53 out of 165

10.1.4 Total number of professional staff in each degree category for each of the years 1962 to 1968 inclusive, and estimates for each of the years 1969 to 1973.

10.1.5 Number of staff in each degree category on educational leave.

Departmental Totals (Food and Drug Directorate See below)	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Bachelor.....	78	76	78	99	96	106	107	127	141	148	157	167
Master.....	53	54	62	67	71	83	85	114	140	153	159	167
Doctor.....	54	59	57	66	72	73	79	86	100	106	108	113

10.1.6 Percentage of current professional personnel who, since graduation, have been employed by industry

(i)	have been employed by industry	34%
(ii)	have been on the staff of universities	28%
(iii)	have been on the staff of provincial departments	25.5%
(iv)	have been on the staff of other Federal agencies	18.5%

Year	Professional	Support	Total
1967-68	99	100	199
1968-69	104	108	212

10.1.7 Number of university students given summer employment in the field of scientific activities for the years 1962 to 1967.

	1962	1963	1964	1965	1966	1967
Fitness & Amateur Sport	-	-	-	-	-	-
Welfare Assistance & Services	-	-	1	2	2	1
Research & Statistics	3	4	5	7	7	6
Department Library	-	-	1	2	2	2
Information Services	1	1	1	1	1	1
Health Services Branch:						
Laboratory of Hygiene	3	3	3	3	7	7
Occupational Health	8	8	8	8	8	8
Radiation Protection	3	3	3	3	3	3
Nutrition Division	-	-	-	-	-	-
Epidemiology Division	2	2	2	2	2	2
Dental Health Division	-	-	-	-	-	1
Public Health Engineering	5	5	5	10	16	25
Mental Health Division	-	-	-	-	-	-
Rehabilitation Services	-	-	-	-	-	-
Child and Maternal Health Division	-	-	-	-	-	-
Research Development	1	1	1	1	1	1
Health Insurance & Resources	2	2	2	2	2	2
Department Totals (Excluding Food & Drug Directorate)	28	29	32	41	51	59

10.2 PERSONNEL POLICIES

10.2.1 General Comment

Scientists constitute a rapidly growing group in the Department and the scope of their employment is widening steadily to meet new and increasing technological and socio-economic demands. They must have opportunities for advancement as professional employees and make their effective maximum contribution towards the achievement of departmental objectives. To promote the effectiveness of research management and maintain high professional standard it is also necessary to identify those members of the staff with high potential as research administrators. To meet these objectives personnel programmes including carefully planned methods of recruitment of scientists from outside sources such as university centres of education, as well as the judicious selection of scientists from within the Department or other agencies of the Federal Government whenever this is possible in the first instance, are being carried out.

Policies of promotion from within the Department involve the maintenance of inventories of scientific skill already present, continuing attention to organization planning to make rational use of scientists where they are most needed and the implementation of special programmes for the training and development of scientists already on the staff of the Department.

In doing so, the Department is endeavouring to develop a total scientist development programme adjusted to its growing requirements and personnel policies which are being gradually evolved or considered necessary to maintain a proper balance between its external supply of scientists while at the same time making more effective use of those already on strength in the Department. These personnel policies and procedures are discussed in the following sections of this report.

10.2.2 Steps taken to identify and hire those members of university graduation classes who will be the most effective researchers for the Department.

- i) - Recruiting teams are formed consisting of Departmental specialists employed in scientific activities and Public Service Commission officer(s). These teams visit universities on annual university recruiting drives. Other specialists in the same scientific activities from other Departments perform in concert with P.S.C. officers, a similar function for their organization. Selection of candidates is made by interviewing students who have indicated, by responding to a general pre-visit invitation for an interest in employment in the Public Service of Canada. When interviews across Canada have been completed, the recruiting teams come together and determine, from among all the candidates who have been qualified for employment which are the most desirable for employment in the Public Service. The most desirable under-graduate, graduate, and doctoral students are then sent offers of employment by the Public Service Commission and the less desirable candidates are sent letters indicating their status.
- ii) - Liaison is maintained with all universities across Canada and lists of knowledgeable Departmental personnel who will be available in various parts of Canada at various times throughout the school year are made available to Canadian universities. These result in guest-lectures by Departmental personnel to under-graduate, graduate, and doctoral students as well as to the entire professional community.
- iii) - Most of the Deans of the bio-sciences in Canadian universities are involved in some way with the Department of National Health and Welfare; particularly with the Department's Food and Drug Directorate. The Food and Drug Directorate, by demonstrating the challenge provided for researchers in its research activities, has achieved a reputation in Canadian universities as a desirable organization in which to obtain employment following graduation.

- iv) - Both professorial and student contacts are made by Departmental scientists attending scientific meetings. Hospitality rooms have been set up at this type of meeting for the express purpose of providing information about the Department to educators, students, and professionals employed outside the Public Service of Canada.

10.2.3

Unique Criteria Developed (or any research initiated to develop criteria) to Help Identify those who will be Creative and Effective Researchers

Research, in which this Department participated, has been undertaken during 1968 by the Public Service Commission Research and Test Development Division in an effort to develop criteria to help identify those who will be creative and effective researchers.

General conclusions arising from the Public Service Commission research study are set out hereunder.

"Biographical information, tests of intelligence, creativity, personality and special aptitudes have been used with some success in the identification of the research scientist. The interview which is widely used in this area has not come under the objective study of the psychologist. This tool has been used in the selection of individuals for other professions but here again little objective information is available. Advocates of the interview state strongly that this is perhaps the most valid technique, but they are hard-pressed to empirically defend their position. This is not to say that the interview cannot be used successfully. However, research is needed to determine its validity".

"University classmarks have also come under criticism (L.L. Thurstone, 1964). Here again, statistical data is lacking and until such time as research is done in this area we will have to reserve our judgement in its evaluation".

"It would seem that scientific researchers and research managers differ according to certain qualities. The characteristics of a good researcher are not necessarily the same ones for the good research manager."

"In conclusion, although there are only relatively few studies

conducted in this area, there are some existing techniques which could be used in the selection and identification of research scientists and research managers but these would have to be empirically validated in the situation for which they will be used.

10.2.4

Steps Taken to Identify those Members of the Staff with High Potentiality as Research Administrators

The main vehicle for identifying potential research administrators is a results-orientated performance appraisal program currently in use in the Department and which applies to research scientists whose primary purpose is to conduct fundamental or applied research in the biological or physical sciences or in mathematics. Those included in the program are:

- Employees engaged primarily to develop, improve or extend concepts or systems of knowledge of biological or physical processes or phenomena, using methods appropriate to the relevant scientific disciplines.
- Employees engaged primarily to design or improve methods, materials, products or apparatus required for a specific and practical purpose, if scientific and research methods are employed and if the results are acceptable as original and significant contributions to scientific knowledge.
- Mathematicians engaged, in physical or biological research organizations, primarily, to originate theoretical models, techniques of statistical analysis, or novel experimental design.

Following are the criteria for assessing the performance of research scientists. The criteria are based as far as possible on achievement and productivity rather than on attributes of the individual.

Primary Criterion: Productivity

Both cumulative productivity and current salary rate are considered. Productivity is construed broadly, and not simply

in terms of published papers. However, in considering other forms of productivity, it is decided whether or not the activity is an appropriate alternative to publication. Evaluation of this factor is normally based on the main form of the individual's productivity. If effort is nearly evenly divided between two or more forms of productivity, the accomplishment reasonably possible in the time devoted to each is assessed. However, though divided effort might explain reduced quantity of output, it cannot justify lowered quality. Significant achievement in more than one form of productivity may justify a somewhat higher assessment than a similar aggregate achievement in only one form. Account is taken of a secondary form of productivity, however, only if it is appropriate in a general way to the individual's assignment. The following are some of the main forms of productivity:

- (1) Published reports of research, including papers critically and synthetically reviewing fields of knowledge, to be assessed on quality, scientific and practical significance, and quantity.
- (2) Unpublished reports, where publication is inappropriate because of confidentiality, or, exceptionally, where the schedule of a project makes rapid publication inappropriate. These should be assessed on the same criteria as published reports.
- (3) Patents, improved varieties or designs, or other evidence of successful development work. These are to be assessed on conceptual originality and difficulty, on the practical difficulties and responsibilities inherent in the development process and, where appropriate, on the value and breadth of application of the end products and on the recognition accorded to them.
- (4) Contributions to the research work of others, e.g.:
 - (a) generation of ideas for work done by others;
 - (b) advice to or consultation with other scientists or the organization as a whole on methods, background information or problem solving;

- (c) scientific leadership of research teams or projects;
- (d) expert advice on difficult scientific questions;
- (e) contribution to effective working arrangements in the discipline in or outside the employing organization.

Supplementary Criteria

The aggregate weight assigned to supplementary factors in assessment is considerably less than that assigned to productivity.

Nature of Work Assignment. In research and development the level of the work is generally determined by the individual himself within a very generally defined assignment. The work assignment is therefore regarded as a supplementary rather than as a primary criterion. However, restriction to work assignments giving little scope for originality or for independent judgement is normally considered as evidence of low achievement. Conversely, regular assignments to work requiring a high degree of research ability are normally considered as supplementary evidence of high achievement.

Skill in Communication. As research is not completed until communicated, a reasonable degree of communication skill is presupposed in productivity. However, exceptional skill in either writing or speaking is of value to the organization as a whole, and may be considered a supplementary favourable criterion.

Working Relationships with Associates. Reasonable conformity with organizational policies and procedures and reasonably harmonious working relations with associates are normal. Unsatisfactory performance in these areas is regarded as a detracting factor only if it materially detracts from the efficiency and productivity of the organization. Conversely, exceptional personal contributions to efficiency and good working relations in the organization may be considered a supplementary favourable factor.

Recognition. The breadth and level of recognition of the research scientist's achievement and ability are a supplementary criterion. If there is a serious and unexplained difference between the scientific recognition and the assessment based on other factors, the assessment is re-examined.

Qualifications. Normal education, experience and achievement are given under "Normal Qualifications" for each grade; these are not construed as minimum qualifications.

Discretionary Criteria

Responsibility in Direction and Supervision

If responsibility for directing or supervising research becomes primary, transfer to the Research Director class is considered. If responsibility for direction or supervision is secondary it may compensate for a quantitative reduction in research performance, but not for poor or mediocre performance. The non-research component of the work is assessed according to the standards of the Research Director class, following the procedure prescribed for assessing scientific work of mixed composition.

Other Non-Research Factors.

Responsibilities in other non-research activities that may be assigned to a research scientist are assessed on principles similar to those used for assessing direction and supervision.

10.25

Distinctions are Made Between Administrators of Research and Researchers as such; for example, regarding promotion, salaries, etc

(1) Research Administrators - Provisional Determination of

In-Grade Pay

The following provisional guide lines have been developed for use in determining the amount of a merit increase for each research director or coordinator. The choice made each year in respect of any research director or coordinator who has not reached the maximum rate of his range is whether he should be granted any increase, and, if an increase is justified, what it should be. All increases must be earned and the size of an increase is related to the individual's performance when assessed

against the expectations of his superiors and the performance of other officers in the same grade. Generally speaking:

- (1) An increase of one step in the pay range may be granted whenever the performance of the research director or coordinator is acceptable for his grade.
- (2) An increase of two steps in the pay range may be granted whenever the performance of the research director or coordinator consistently satisfies the normal expectations of performance in his grade. An officer may progress beyond the normal maximums in his pay range only when his performance consistently exceeds the normal range of expectations for his grade.
- (3) An increase of more than two steps in the pay range may be granted whenever the performance of the research director or coordinator is highly commendable in comparison with that of the majority of others in the same grade.

In assessing performance for merit-increase purposes, recent and current performance as a research manager only is measured. If the position occupied by an officer has low demands relative to a majority of the positions in the grade, the standards of expected performance are correspondingly higher. Performance is therefore to be appraised against the normal expectations of the officer's grade, and not of his position alone.

The following factors are considered, to the degree that each factor is a relevant measure of the individual's performance, in appraising a research director or coordinator. The effectiveness of performance is measured by the individual's impact on the quality and productivity of research.

- (1) Effectiveness in determining research needs and priorities, and in guiding research programmes towards them.
- (2) Effectiveness in identifying, developing, and motivating the research ability of his scientific staff and associates.

- (3) Effectiveness in assessing proposed research projects and programs, in evaluating research underway, in coordinating related projects and programs, and in constructively criticizing written and oral presentations of research findings.
- (4) Effectiveness in directing or coordinating internal management programs to serve the objectives of the research organization, and in assessing the staff and budgetary requirements of his organization.

Merit increases are normally awarded in this class simultaneously with merit increases in the Research Scientist 1-4 class. As evidenced by the foregoing, a results-orientated performance appraisal program is employed by the Department to assess the effectiveness of research administrators. As in the case of research scientists this program is designed to relate the classification and salary of the individual to significant measures of his assigned responsibilities and to the appraisal of his personal performance.

The research management performance appraisal program includes scientists whose primary purpose of employment is to direct, coordinate or advise on the direction of programs of research in the biological or physical sciences. It also includes directors of statistical research units in organizations devoted primarily to biological or physical research.

The distinction between administrators of research and researchers as such in respect of promotions is not significant in that the primary criteria for promotion in both groups is productivity. In the case of research administrators an assessment is made of the productivity of the position incumbent's establishment and of his contribution in terms of direction or coordination, whereas the performance of a research scientist is assessed on the basis of his individual productivity as related to his current research work and responsibility.

(2) Research Scientists - Determination of In-Grade Pay

Each research scientist is appraised annually by a superior who is well informed on the individual's work to determine whether a merit increase should be recommended. All recommendations for merit increases are reviewed by a committee of scientists competent to assess the performance of the individual against that of other research scientists both within and outside the employing organization, on the basis of carefully selected criteria for assessment. The appraisal committee establishes the appropriate position of the individual in relation to other research scientists of similar maturity (years from bachelor graduation) throughout the scientific research community. The individual is compared primarily with others of the same maturity, but retrospective comparisons with former members of the maturity class and prospective comparisons with those soon to enter it may be made. In the assessment of the individual, the average or mean performance for his maturity is initially taken as a base, which is related to the mean salary specified in the "Salary Guide" for the department. Deviation from the mean (or median) salary is recommended by the committee to the extent clearly justified by the individual's performance. The amount of an upward or downward deviation is assessed in terms of the proportion of research scientists, in the entire scientific community, that show the deviation of the individual, e.g., one in four, one in ten, one in 100. When this judgement has been made, the individual's grade already having been determined, the appropriate salary for this achievement and maturity will be indicated by the "Salary Guide" for the department. Maturity is calculated by years from bachelor graduation, as indicated above. Special circumstances, such as an interruption of the research career or a delay in obtaining a post-graduate degree, do not alter the individual's maturity for the purpose of appraisal but may explain deviations from normal performance. Merit pay increases are not awarded, under any circumstances, except as justified by the individual's performance on the basis of criteria mentioned previously and the salary guide.

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The "Salary Guide" for the department comprises:

- A salary-maturity distribution representative of the expected distribution of members of the Research Scientist 1-4 class in the department.
- A salary-maturity distribution illustrating the expected salary progression for individuals during the first six years after entry to the Research Scientists class.
- A salary-maturity distribution representative of the expected distribution of members of the Research Scientist 1-4 class in the department.

The Salary Guide for the department is an approximation, developed in consultation with the Public Service Commission's Advisory Committee on Scientific Personnel, of a salary-maturity distribution appropriate to the members of the department who are expected to be in the class. The Salary Guide is designed to serve two purposes:

- (1) The Guide is designed to assist an appraisal committee in reaching a judgement about the individual's salary within his appropriate grade, on the basis of the relative quality of his performance when measured by the criteria specified in this standard. The Salary Guide is not intended to prescribe the actual distribution to be recommended for the class population as a whole in the department.
- (2) The Guide is also designed to specify the maximum average salaries to be paid to the class population in the department specified. The maximum average salary will be that which would result if all members of the class were to be paid the mean rate for their year of maturity as specified in the Salary Guide for their department. It will be calculated by dividing the number of class members in the department into the sum of the products of mean rate specified in the Salary Guide multiplied by the number of members in each year of maturity.

Assessments to determine the grade and merit pay rate for members of the class are normally conducted annually with effect on April 1.

(iii) Salary Ranges - Research Scientists of Research Managers(a) Research Scientists

Approximate Rates in Salary Maturity Distribution

Year from Bachelor Graduation	First Decile	First Quartile	Mean	Third Quartile	Ninth Decile
3			9,216		
4			9,347		
5			9,507		
6			9,667		
7			9,828		
8			9,988		
9			10,148		
10			10,308		
11	9,788	10,125	10,470	11,508	12,407
12	9,836	10,305	10,814	12,092	13,088
13	9,885	10,485	11,165	12,677	13,771
14	9,934	10,665	11,515	13,260	14,452
15	9,982	10,845	11,866	13,844	15,134
16	10,030	11,025	12,206	14,428	15,810
17	10,079	11,206	12,548	15,012	16,488
18	10,128	11,385	12,887	15,596	17,166
19	10,177	11,566	13,227	16,180	17,843
20	10,225	11,746	13,567	16,764	18,520
21	10,274	11,927	13,907	17,348	19,198
22	10,322	12,107	14,247	17,932	19,875
23	10,371	12,287	14,587	18,516	20,553
24	10,419	12,468	14,927	19,100	21,230
25	10,469	12,647	15,267	19,684	21,908
26					

-----Class Progression Ends-----

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(b) Research ManagersResearch Management, Grade 1

FROM	\$	11,034	11,355	11,665	11,974	12,284	12,593	12,903	Amended by T.B. 679140 dated 8-5-68
		13,212	13,522	13,831	14,141	14,451	14,760	15,070	
		15,379	15,689	15,998	16,308	16,618	16,927		

Grade Mid-Point \$13,980

TO	\$	11,034	11,355	11,665	11,974	12,284	12,593	12,903	Effective 1-7-67
		13,212	13,522	13,831	14,141	14,451*	14,760	15,070	
		15,379	15,689	15,998	16,308	16,618	16,927	17,284	
		17,642	18,000						

* Grade Mid-Point

Research Management, Grade 2

FROM	\$	15,999	16,391	16,786	17,180	17,574	17,968	18,363
		18,756	19,151	19,545	19,940			

Grade Mid-Point \$17,969

TO	\$	15,999	16,391	16,786	17,180	17,574	17,968	18,363	*
		18,756	19,151	19,545	19,940	20,420	20,900		

* Grade Mid-Point

Research Management, Grade 3 **

FROM	\$	18,757	19,222	19,680	20,138	20,596	21,054	21,512	21,970
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Grade Mid-Point \$20,364

TO	\$	18,757	19,222	19,680	20,138	20,596	21,054	21,512*	21,970
		22,502	23,034	23,566	24,100				

* Grade Mid-Point

* Grade Mid-Point to be used to calculate maximum annual salaries payable by class by department.

** Exceptional merit rates in excess of the maximum rate in the scale of rates for research management, Grade 3, to be approved by the Treasury Board.

10.2.6

Policy Regarding Intramural and Extramural Education for Staff Members Conducting or Administering Research1. Intramural Education

While a policy regarding intramural education does not exist in the Department, considerable intramural training takes place as indicated by the following:

- i) Management Orientation Programme - Food and Drug Directorate - April 2-5, 1967 - Montreal. This was a highly successful programme conducted by senior administrative officers of the Department and dealt in depth with subjects pertinent to the administrative role of Food and Drug Directorate senior management personnel; 30 of whom were in attendance from across Canada.

Some of the subjects discussed included:

- Organization behaviour concepts and factors underlying management theories
- Traditional and new concepts of management based on experimental evidence and the experience of managers
- Inventory of management functions - a review of people management functions and the implications that new concepts have for them.
- Departmental financial management
- Departmental personnel management

- ii) Management Development Seminar - Medical Services Branch - February 11 to 15, 1968 - Ottawa.

The objectives of this seminar were to:

- 1) Create an awareness of the managerial role within the changing climate of the Department.
- 2) Provide some personal insight into the kind of behavioral change and individual adaptation required in order to meet these changes.
- 3) Provide a frame of reference and a broad understanding of the changes in two administrative and management operations - namely, financial and personnel management.

Specific subjects discussed at this seminar were:

- The nature of management
- Management by objectives

- The staff-line concept
- Centralization and decentralization of organization
- The objective of current changes in Departmental personnel management
- Manpower planning
- The job-classification system
- Staff relations and collective bargaining
- Glassco recommendations for improved financial management
- A profile of the proposed Departmental financial management system.

111) Management Development Seminar - Health Services Branch -
conducted from October 1 to 4, 1968 at St. Adèle-en-haut, Québec.

The course, which is relatively unstructured, will include 22 senior managers of the Health Services Branch. The theme of the seminar is "Resource Management for an Effective Program" and its objective is to provide an opportunity for officers of the Health Services Branch:

- (a) to explore the implications of the concepts, principles and practices of modern management
- (b) to be stimulated to further study and experimentation directed to effective implementation of these concepts, principles, and practices
- (c) to receive information and instruction on practical aspects of personnel and financial management.

2. Extramural Education

- (a) Determination of need for education and type of training considered.

The departmental Planning Guide for Training and Development is currently being revised. In lieu of the guide the following guidelines have been developed in co-operation with the Treasury Board.

The primary consideration in planning a training program is the establishment of a relationship between the program and the objectives of each branch or division. Training needs, are, therefore, the difference between the capability of our manpower resources and the present or

anticipated demands of operating programs. Examination of such differences leads to the identification and establishment of means to meet the needs.

The second consideration is with the needs and goals of each of our employees related to the program objectives. Individual staff selections for training are made in the light of employee aspirations, capability and potential for growth and promotion.

The cost of training is an important factor and is considered in relation to funds available for this purpose. Normally, provision for training costs is projected in Program Review and Estimates and are thought out well in advance.

Participation in a training program may only be authorized by including all training, regardless of the time and money involved, in the departmental annual training program except when the need is imperative, when individual submissions may be made during the fiscal year.

A Branch training and development program is considered in four parts as follows:

1. Extramural training involving:
 - (a) leave of absence and payment of an allowance in lieu of salary, tuition, travel and living costs;
 - (b) special courses of varying duration requiring payment of tuition, books, travel and living costs;
 - (c) short courses that are covered by continuing Treasury Board Authority 524534-1, i.e., courses of two weeks' duration or less where the total expenditure for tuition, travel and living expenses does not exceed a maximum of \$600.00 for one or more trainees. (Such courses do not require approval of Treasury Board but may be included in an annual training plan).
2. Evening and correspondence courses involving payment of up to 50 percent of tuition fees as authorized by Treasury Board 620135 of March 6, 1964. Courses

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requiring absence from normal working hours are not covered by this authority.

3. Extramural public service training including courses in:

- (a) Management and administration;
- (b) Languages;
- (c) Technical and skills development.

4. Post-graduate transfers of work: A transfer of work affords certain selected officers the privilege of working for a substantial period with a distinguished colleague in another work environment. The main objective is to provide a fresh philosophy which will serve to give renewed direction and stimulus to his future work.

A transfer of work is considered for officers who have completed their formal education, normally at the Ph.D., level, and usually with five or more years of creditable performance with this or another government department or agency.

Recommendations dealing with a Transfer of Work include the following:

- (1) The name of the applicant and a summary of his training, experience and major contributions.
 - (2) The name and affiliation of the officer with whom the applicant proposes to work; the reasons for the choice, and a brief description of the proposed field of study.
 - (3) An estimate of benefits to be derived by the candidate and his organizational unit.
 - (4) An estimate of cost.
 - (5) A supporting statement from the Director or Chief of the division.
- (b) Cost Considerations
- Consideration may be given to the following in reaching a decision in respect of paying any individual's expenses:

(a) Allowance Equivalent to Full Salary

In cases where fully trained specialists are in extremely short supply and the organization selects the officer to undertake a planned program of post-graduate or other training.

(b) Allowance Equivalent to Half Salary

In cases where the supply of fully trained specialists is less critical but where the training is directly related to the duties of the position and will better equip the officer to carry these out.

Travel: This is the cost of actual travelling expenses of the candidate as stated in the Manual of Travel Regulations, from place of employment to place of training, and to designated place of employment on termination of the course. Return travel expenses are paid only once during the period of training.

Living: The amount provided is for the actual living expenses incurred by the attendance of an employee at a training course.

Others: Depending on circumstances, management may feel that additional financial assistance is necessary for other than evening or correspondence courses.

This may involve:

(a) Books: The recommended expenditure may be \$40 for diploma courses and, in some instances, \$50 for doctorate studies.

(b) Field Trips: It is sometimes necessary for candidates to participate in field trips as part of their course of training. Therefore, it is important that this be included in the estimate of cost.

(c) Removal Expenses: Where the need for training is imperative, it may be necessary to provide for the payment of full or partial removal expenses of a candidate and his family. This

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eliminates the unnecessary burden of maintaining two dwellings and reduces additional living expenses.

- (d) Living Allowance: Under extenuating circumstances, it may be necessary to secure authority for a living allowance to be paid to an officer proceeding on an extended course of training. Example: Where it is not possible for the officer's family to accompany him and the maintenance of two households becomes necessary. A very strong substantiation of the situation is required to obtain approval of such cases.

The Director General is responsible for the review and final Branch approval of all recommendations. It is therefore the responsibility of each Branch to determine whether the proposed training is related to and required to meet organizational objectives, and what financial entitlements should be recommended for each course of training. An all inclusive training program for the branch is then submitted to the Manpower Planning Division of the Personnel Administration Directorate for co-ordination with other Branch programs and subsequent submission to the Deputy Ministers and the Treasury Board for approval.

11. DESCRIPTION OF SCIENTIFIC ACTIVITIES OF THE DEPARTMENT BY
INDIVIDUAL UNITS

11.1 MINISTER

The Minister is responsible to Parliament for the general administration and management of the Department of National Health and Welfare.

His responsibilities relating specifically to the scientific activities of the Department are described in detail in Section 8 of this Brief. He exercises these responsibilities largely through delegated authority.

The Department is scientifically oriented and by virtue of his office, the Minister is continually concerned with the making of policy decisions relating to scientific activities of the Department. In accordance with established procedure, scientific programs and projects are also submitted to him for his consideration and approval. In doing so he acts as general coordinator of all scientific activities of this Department. He also exercises a broad coordinating role in relation to departmental scientific activities and those of the Medical Research Council of Canada.

Finally, he represents the Government of Canada at national and international meetings and conferences concerned with science and technology.

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11.2

DEPUTY MINISTER OF NATIONAL HEALTH

Organization

The Deputy Minister of Health is assisted by three officers who provide staff assistance and also assigned to various operating roles. They hold the following offices:

- (a) The Office of International Health,
- (b) The Office of Special Projects,
- (c) The Office of Nursing Adviser.

The Deputy Minister of National Health has the management of the Health Organization of the Department and he also shares the responsibility for the management of the Administration Branch and Central Service Divisions with the Deputy Minister of Welfare.

Scientific Activities

The activities of the Health Organization of the Department are primarily scientific, and in his capacity as senior officer of that part of the Department he is responsible for the general management and coordination of a wide range of scientific activities.

Some of these include:

- (a) the provision and advice to the Minister of National Health and Welfare on matters of policy relating to scientific activities of the Department in the health field;
- (b) he is Chairman of the Dominion Council of Health, the principal advisory body to the Minister of National Health and Welfare on matters relating to health. The coordinating functions and advisory role of this Council on scientific activities of national significance are of paramount importance and are described in Section 11.2.4 of this Brief.

- (c) He is also Chairman of the Health Resources Advisory Committee established under the authority of the Health Resources Fund Act.
This Body provides advice to the Minister of National Health and Welfare on plans and programs relating to the administration of the Health Resources Fund, and including health manpower planning;
- (d) He coordinates departmental policies relating to scientific activities with the Deputy Minister of Welfare;
- (e) He is a member of the Interdepartmental Panel on Science and Technology, a coordinating committee concerned with periodic reviews of scientific programs operated by government departments and agencies;
- (f) He represents Canada at international conferences including WHO meetings. This specialized agency of the United Nations is concerned with scientific activities of international significance such as international medical research, etc.;
- (g) He holds weekly staff meetings with his senior officers during which scientific activities of the Department are reviewed and coordinated.

11.2.1 INTERNATIONAL HEALTH

11.2.1.1 Authority

General authority for the activities performed in this area is provided by the Department of National Health and Welfare Act, Section 5, which stipulates that "The duties, powers and functions of the Minister extend to and include all matters relating to the promotion and preservation of the health, social security and social welfare of the people of Canada over which the Parliament of Canada has jurisdiction," and the formal ratification of the Constitution of the World Health Organization by the Government of Canada, August 21, 1946. An executive memorandum dated June 20, 1960, established International Health on an independent basis, later to be included in the Office of the Deputy Minister of National Health.

11.2.1.2 General

Canada actively assists and cooperates with the World Health Organization and the other Specialized Agencies of the United Nations whose programs have a substantial health component or orientation, such as international medical research, communicable diseases control, environmental health, health statistics, biology, pharmacology and toxicology, health education and training. Capital and technical assistance are provided to developing countries through the Colombo Plan and other bilateral aid programs in which Canada participates. Health training is arranged for an increasing number of persons coming to Canada each year under the different technical cooperation schemes. Support is also provided in the recruitment of Canadian medical, nursing and other professional and ancillary health personnel in the main for special assignments on request of governments on a bilateral basis, for assistance in the development of their general health services and in the education and training of their own personnel.

The World Health Organization is in the process of establishing a Biomedical Research Information Service and with the collaboration of International Health a number of Canadian health teaching and research institutes are cooperating in this endeavor.

11.2.1.3

International Health and Scientific Activities

- (a) International Health provides advisory and consultant services to the Canadian International Development Agency, on request for technical assistance in the health field.
- (b) It is also concerned with the promotion and coordination of the Department's interest in health matters arising in the various United Nations organs or agencies such as the Economic and Social Council, Food and Agricultural Organization, International Labor Organization, the International Atomic Radiation, the U.N. Narcotics Commission, the United Nations Children Fund (UNICEF),
- (c) It maintains liaison with the Federal Departments of External Affairs, Finance, Agriculture and Labour, for the coordination of interests in relation to policies to be followed by Canadian delegations to the annual World Health Assemblies, and to prepare and assist in the briefing of such delegations and to participate at such Assemblies in respect thereto.
- (d) This office makes the arrangements for the placement, programming and reception of scholars and travel fellows being sent to Canada for training under the various international technical assistance auspices, i.e., Colombo Plan, Special Commonwealth Africa Aid Program (S.C.A.A.P.), Independent French Speaking African States program (I.F.S.A.S.), Commonwealth Caribbean Assistance Program, (C.C.A.P.), World Health Organization, Pan-American Health Organization, etc.
- (e) Finally, the Principal Medical Officer, International Health, is the member of the Executive Board of the World Health Organization named by Canada, providing expert advice and assistance on scientific and technical questions, and giving effect to the decisions of the World Health Assembly.

11.2.2

SPECIAL PROJECTS

The office of Special Projects provides staff assistance to the Deputy Minister in managing and directing the health activities of the department. The Principal Medical Officer, Special Projects is responsible under the direction of the Deputy Minister for programs and activities which do not fall within the terms of reference of one of the health branches and for the coordination of health activities involving two or more branches of the department. He acts as liaison officer between the health and welfare branches of the department.

11.2.2.1

Scientific activities

- (a) The Principal Medical Officer, Special Projects is Chairman of the Advisory Committee on Health Communications made of senior scientists representing the health branches and the librarian. It provides advice to the Deputy Minister of Health on matters relating to scientific and technical information activities of the Department.
- (b) He is adviser to the Deputy Minister of Health on science policy and he is currently Chairman of the ad hoc Steering Committee on Science Policy of the Department charged with the preparation of the departmental Brief on Science Policy at the request of the Senate Committee on Science Policy.

11.2.3 NURSING

11.2.3.1 The Definition of Terms

Nursing is one of the disciplines which falls within the broad spectrum of health sciences. It is an independent profession by virtue of possessing a unique body of knowledge and it is interdependent with other health professions in the provision of health services to the Canadian people. It constitutes the largest single professional group of health personnel in Canada with a registration of 112,000 in the year 1967. *

11.2.3.2 Organization, Functions, and Responsibilities of Nursing Consultants

The Department of National Health and Welfare Act of 1944 charged the Minister with responsibility for "all matters relating to the promotion and preservation of health"

In the establishment of programs to meet this responsibility, the Department has recognized the need for nursing positions at federal level. These include eleven consultant or advisory positions, each attached to a specific division and providing service to the Department as a whole and to the provinces in the health field.

The Nursing Consultant positions are not constituted in a Division of Nursing, but under direction of a Medical Director or Chief of a particular Branch or Division. Although administratively responsible to a Medical Chief, the Nursing Consultants maintain a close working relationship with each other, facilitated in the office of the Nursing Adviser to the Deputy Minister through regular monthly meetings. Eight of the consultants are prepared at the Master's level and carry a clinical or functional specialty.

The nursing positions may be classified in three ways.

- (1) A Nursing Adviser to the Deputy Minister, who provides a liaison between the organized nursing profession, nationally and internationally, and the National Department of Health.
- (2) Eight specialist nursing consultants who function in a consultative capacity to officials of the Department, to the provinces, to University Schools of Nursing and to the organized nursing profession.

* Source: Canadian Nurses' Association, Countdown 67, Canadian Nursing Statistics, Ottawa, The Association, 1968.

- (3) Two nursing positions which carry administrative responsibility for a nursing service providing direct care to selected groups of the population, namely, Indians and Eskimos, and public service personnel.

11.2.3.3 Objectives of Scientific Activities

To a greater or lesser degree, each of the nursing positions is concerned with scientific activities. Only one nursing position is assigned on a full-time basis to nursing research and it represents the only position of its kind in Canada.

Since the nursing component of each Division will be included in Divisional submissions for the Brief, an attempt has been made in this submission to consolidate into one nursing report those activities with a scientific connotation carried out by one or all of the Nursing Consultants, as an attempt to show nursing as a whole in the Federal Department of Health. For purposes of brevity where similar activities were carried out in two separate fields as public health and hospital, there has been a consolidation into one statement. The following are the objectives:

- (1) To improve methods for the promotion of health in the community.
- (2) To improve the standard of patient care in the hospital and in the community outside the hospital.
- (3) To effect optimum utilization of all categories of nursing personnel in hospitals and in the community outside the hospital.
- (4) To improve the effectiveness of the nursing service department.
- (5) To assess, plan and improve existing hospital and health centre physical facilities.
- (6) To advise through functional planning on new hospital and community health centre facilities.
- (7) To advise on nursing and paramedical education.
- (8) To identify problem areas for research in nursing.
- (9) To conduct, plan and support research and development.

11.2.3.4 A Description of Scientific Activities

11.2.3.4.1 Research and Development Activities

- (a) Conducting applied research into hospital services and operating problems on invitation from provincial health authorities.

- (b) Studying the utilization of nursing personnel in the hospital and public health field by conducting functional nursing activity studies.
- (c) Initiating and/or developing standards for nursing practice and nursing care.

Example 1 - The preparation of a Statement on the Functions and Qualifications for the Practice of Public Health Nursing in Canada. Initiated by a study of public health nursing activities conducted by the public health nursing consultant.

Example 2 - Standards for the Care of the Mother and New Born. Initiated and developed by the Child and Maternal Health Division.

- (d) Co-operating with the Canadian Nurses' Association in the development of standards and objectives for the assessment of the quality of the hospital nursing service department.
- (e) Discussing and exchanging information and helping to set priorities for research.
- (f) Reviewing and evaluating research proposals from the field.
- (g) Providing consulting services on request in respect to the planning, conduct, progress review and evaluation of on-going research projects.
- (h) Initiating and assisting with work shops, conferences, seminars, lectures and publication of articles; in short, emphasis on communication and information, ideas and attitudes relevant to applied hospital and public health research.
- (i) Activity studies of all categories of ward personnel and non-ward personnel who provide service to the staff and/or the patients. To test the effect of system changes on the activities of nursing unit personnel.

11.2.3.4.2

The Training of Scientific Manpower

- (1) Financial assistance to University Schools of Nursing and to nurses is provided by the Department through:
 - The Health Resources fund which provides fifty percent of the cost of building, renovating or improving training and research facilities.

- Post-secondary school education which provides fifty percent of the operating costs of institutions of higher learning, that is Grade 13 and on.

- Professional training grants which provide bursaries to nurses.

Since the National Health Grants Program began in 1948, over 19,000 Canadian nurses have received assistance with post-basic preparation in the form of bursaries for university study or short courses. Initially, the emphasis was on the one-year diploma course to provide additional preparation for nurses in public health and in administration and teaching. In the last five years, there has been a trend towards increasing the number of bursaries provided for study towards baccalaureate, Master's and Doctoral levels.

Number of bursaries granted under National Health Grants Program to R.N.'s for study at Baccalaureate, Master's and Doctoral levels, 1964-5 and 1967-8. ★

YEAR	BACCALAUREATE	MASTER'S	DOCTORAL	TOTAL BURSARIES
1964-5	17	4	0	21
1967-8	304	13	1	328

- (2) Personnel engaged in teaching in University Schools of Nursing and other institutions for nursing education.
- Nursing Consultants teach at University Schools of Nursing on a visiting lecturer basis. In addition, Consultants are involved on an ad hoc basis in seminars, work shops, and institutes at University Schools of Nursing.

Example - McGill University, University of Montreal, University of Western Ontario, University of Toronto, University of Ottawa, University of Manitoba. Teaching involves students at the baccalaureate and graduate level.

★ Source: National Health Grant, N.H. & W. - May, 1968.

- Contact is maintained on a continuing basis with Directors of University Schools of Nursing, (McGill, Manitoba, Western and British Columbia) re the need for training and research methodology and the involvement of fully prepared personnel in research on a full or part-time basis.
 - Training of nursing personnel as research assistants in specific projects such as the study of accuracy of recording of vital signs in hospitalized patients. This was in connection with a study of the effects of systems changed on the activities of hospital personnel and conducted at the Victoria General Hospital, Winnipeg. The Nursing Consultant from the Hospital Services Study Unit guided the research project and undertook the training of support personnel in statistical techniques.
- (3) Supervision of Graduate Students.
- Assist in the supervision of graduate students in summer employment in the Department.
- (4) Provision of field observation and experience.
- Field experience and observation is arranged for nursing students majoring in clinical or functional areas. Programs for these students are arranged within the various branches of the department, with other government departments and with other health and welfare agencies. Nursing Consultants participate in the planning and/or provision of such programs depending on the area of specialty. Specific example: Students from Ottawa, Queen's and Toronto Universities take field work in the Public Service Health Division in completing post-basic diploma courses in public health nursing and in administration.
 - Programs of observation and experience are arranged for senior nursing personnel from ministries of health and university faculties of foreign countries at the request of the World Health Organization, the External Aid Office and foreign governments. There is an increasing interest in observation of nursing activities in the area of research, including the research being carried out through this department.

(5) Sponsorship of Seminars.

Since 1960, nursing consultants have planned and conducted fédéral-provincial nursing conferences on a biennial basis for three separate groups of nurses.

- Directors of Public Health Nursing from provincial health departments,
- Nursing Consultants from provincial Hospital Insurance Commissions, and
- Directors of Mental Hospitals in the provinces.

The objective of these meetings has been to provide a national forum for the discussion of nursing developments and nursing problems in each of the three particular fields. These conferences contribute to staff development for both federal and provincial nurse participants.

(6) Participation in Emergency Health Program of Education.

The Nursing Consultant in this program conducts the only continuing education program on a national basis for nurses across the country. The other nursing consultants assist in teaching as requested.

(7) Staff Development Programs

Activities related to staff development for Nursing Consultants are the following:

A regular monthly meeting of nursing consultants with stated objectives:

- (a) Program reports to keep each other informed on trends and developments on individual nursing consultant programs and on nursing across the country.
- (b) Assessment of national and international nursing meetings as a staff development resource. Value judgements are given in relation to relative merits of having nursing consultant representation at national and international conferences.
- (c) Consideration of major national nursing issues.

The office of the Nursing Advisor to the Deputy Minister provides a unifying centre for these activities facilitating communication and joint participation across Divisional or Branch lines.

- (8) A general statement of policy towards which efforts are directed.

Training and re-training of nursing personnel including Nursing Consultants, undergraduate and graduate students from University Schools of Nursing, and visiting nurses from foreign countries, are directed towards:

- the development of the individual to her fullest potential,
- the development of an analytical approach to the health situation in general, and to nursing in particular,
- the achievement and maintenance of a flexible attitude towards change, and
- the continuous evaluation and renewal of clinical and functional expertise.

11.2.3.5 Co-ordinating Mechanisms

11.2.3.5.1 Professional Societies

Committee participation in nursing, hospital, public health and occupational health organizations at provincial, national, and international levels. Examples of these are the following:

- (1) Chairman of Nursing Service Committee for the Registered Nurses Association of Ontario.
- (2) Chairman of a National Committee to Study the Quality of Patient Care for the Canadian Nurses Association.
- (3) Vice-chairman of the Canadian Nurses' Foundation which administers funds for the preparation of nursing leaders.
- (4) Participant in planning and attending the first joint C.N.A./C.M.A./C.H.A. National Conference in 1967 for the purpose of developing closer working relationships between nurses, physicians and hospital administrators.
- (5) Member of the Committee on Higher Education for Nurses in Canada, Canadian Nurses' Association.
- (6) Chairman of the Advisory Committee for the Preparation of a Statement on the Functions and Qualifications for the Practice of Public Health Nursing in Canada.

11.2.3.5.2 Universities

All nursing consultants collaborate with universities across the country in various ways including:

- lecturing
- assisting with seminars and institutes workshops.
- arranging programs of observation within the Department and other government departments for university students.
- consultation with university faculties in relation to curriculum review, exploration of nursing needs and nursing problems of mutual concern.

11.2.3.5.3 Other Departments of Federal Government

- (1) External Aid Office as referred to in 11.2.3.5.5
- (2) The Department of National Defence. The Nursing Consultant from Emergency Health Services assists on a regular basis with the orientation of Nursing Sisters at the Canadian Forces Medical Training Centre at Camp Borden.

11.2.3.5.4 Departments of Provincial Governments

All nursing consultants work with the Provincial Departments of Health on a request basis. This includes such activities as:

- assisting with the planning and/or conduct of nursing studies in hospitals or public health field.
- provide orientation and guidance for provincial nursing consultants in the development of their programs.
- maintain liaison with provincial governments and provinces, information and assistance on those aspects of health programs that relate particularly to the consultants' special field.

11.2.3.5.5 International Agencies

Nursing consultants work with international agencies in a variety of ways each of which involves some scientific activities in nursing service and/or nursing education. The following are examples:

World Health Organization

- (1) Assignments for the World Health Organization on a short-term basis.

The Nursing Adviser to the Deputy Minister has served as consultant to three projects:

- a multidiscipline national health planning team in North Africa,
- a series of refresher courses for public health nurses in the West Indies, and
- as an adviser to the federal and territorial ministries of health in the West Indies Federation.

The Hospital Nursing Consultant has served as a consultant to two projects:

- a nursing education seminar in Iran,
 - a nursing function study in hospitals in Jamaica.
- (2) Collaborating with W.H.O. in planning programs for foreign nurses to study at Canadian universities.
 - (3) Planning and participating in observation programs for senior nursing personnel from foreign countries sponsored either by W.H.O. or E.A.O.

External Aid Office

- (1) Advisory service is given to E.A.O. by the Nursing Adviser to the Deputy Minister on matters related to Canadian nurses in overseas service -- review of applications, pre-posting and exit interviews, as requested.

11.2.3.5.6

International Agencies

This is referred to under 11.2.3.5.5. The Nursing Consultant collaborates with foreign governments in several ways:

- when assigned by the Deputy Minister to provide consultation to foreign governments on request,
- preparing programs for nurses from foreign governments and listed under number 11.2.3.5.5.

11.2.4 THE DOMINION COUNCIL OF HEALTH

11.2.4.1 Authority

The Dominion Council of Health is a statutory advisory body to the Minister of National Health and Welfare, established in 1919 and deriving its present legislative authority from Section 7 of the National Health and Welfare Act 1944 (R.S.C. 1952, c.74). It is composed of the Deputy Minister of National Health who acts as Chairman, the deputy ministers of health of each of the ten provinces and five appointees of the Governor in Council, selected by tradition to represent such major segments of the population as agriculture, organized labour, medical science and women's French-speaking and English-speaking organizations. It is the principal advisory body to the Minister of National Health and Welfare on matters relating to the health of the people of Canada.

The duties and powers of the Council as formally prescribed by the Governor in Council are:

- (1) The consideration of matters relating to the promotion or preservation of the health of the people of Canada and the initiation of recommendations and proposals to the Minister of National Health and Welfare and other appropriate authorities in regard thereto;
- (2) The furnishing of advice to the Minister of National Health and Welfare in respect to the matters provided in Section 5 of the Department of National Health and Welfare Act, relating to the promotion or preservation of the health of the people of Canada, over which the Parliament of Canada has jurisdiction.

11.2.4.2 Coordinating Role

Through the Council a direct means of cooperation at the technical level is provided between provincial health departments and the Department of National Health and Welfare involving several interacting and coordinating mechanisms. In addition to being able to draw on both federal and provincial resources to aid its deliberations

it is assisted by a number of advisory and technical committees through which the federal and provincial officers concerned, as well as experts in the specific fields, may get together to consider appropriate ways of advancing the programs within these areas.

These committees include -

- Advisory Committee on Public Health Research
- Advisory Committee on Immunizing Agents
- Expert Committee on Occurrence of Congenital Anomalies
- Dominion-Provincial Nutrition Committee of the Canadian Council on Nutrition
- Advisory Committee on Mental Health
- Technical Advisory Committee on Public Health Laboratory Services
- Advisory Committee on Prosthetic Services
- Advisory Committee (to the Minister of National Health and Welfare) on Maternal and Child Health
- Advisory Committee on Hospital Insurance and Diagnostic Services
- Advisory Committee on International Health
- Advisory Committee on Epidemiology
- Advisory Committee on Radiation Protection
- Advisory Committee on Emergency Health Services
- Advisory Committee on Dental Health
- Advisory Committee on Public Health Engineering

The Council usually meets twice each year. Any member may submit items for the agenda and any agency wishing to make representation to the Council may do so. Consideration of a matter by the Council usually infers that it is of some common interest or concern to more than one province, but members are free to seek its advice regarding a problem of particular or individual interest should they so desire.

Although the Council is of a purely advisory character its recommendations reflect the considered opinions of senior health

administrators and scientific workers across the country and have had very considerable influence on the development of public health administration in Canada. The recommendations frequently have led to an early combined approach by federal and provincial governments which might otherwise have been achieved only after long periods of negotiation.

11.24.3

Activities of Council and their Impact

The unique effectiveness of an organization such as this, in a federally governed country, has been demonstrated on a number of occasions. The Council has taken an active part in the development of the National Health Program and, in addition to advising on the general operation of the program and on situations developing in different provinces, has played an important role in many combined federal-provincial projects.

During 1967, Council met in April and November. At the April meeting a prominent place was given to the question of measles vaccine and the procedures in the various provinces for the immunization of children, as well as the problems encountered with respect to this relatively recent development. Other subjects concerned the current situation in Canada regarding Lysergic Acid Diethylamide (LSD), emergency drug regulations, the registration and licensing of foreign-trained physicians, a progress report on the smoking and health program.

At the Fall meeting in November, a report from the Radiation Protection Division was received which dealt with X-Ray Standards and with the potential radiation hazards from colour television receivers. The current status of environmental pollution and control, including air pollution, water pollution, and advances in sewage treatment methods, was fully discussed, as well as recent changes in medical stockpile and pre-positioning programs under the Emergency Health Services, measles prevention programs throughout Canada, the Hazardous Substances Act and other health

legislation.

At both sessions, reports were received from the various advisory and expert committees, and with respect to such activities as the National Health Grants program, the Hospital Insurance and Diagnostic Services program, Medical Care development, and the Health Resources Fund.

Because of its character the Council can act objectively in promoting the best interests of public health and while pursuing this basic objective, it is a focal point of national leadership concerned with the development and performance of scientific activities aimed at meeting Canada's health needs.

As such and as the principal advisory body to the Minister on matters relating to the health of the people of Canada, it fulfills a substantial role towards the formulation and establishment of departmental science policy.

11.3

DEPUTY MINISTER OF NATIONAL WELFARE

The Deputy Minister of National Welfare with the assistance of his immediate staff, has the following responsibilities:

To advise the Minister on matters of policy.

To prepare proposals for future programs for consideration by the Minister.

To manage the organization and resources of the Welfare Branch which includes, the Income Security Branch, the Welfare Assistance and Services Branch and the Fitness and Amateur Sport Branch, and he also shares the responsibility for the management of the Administration Branch and Central Service Divisions with the Deputy Minister of National Health.

To advise and assist the Minister in his relations with the people of Canada, other departments and agencies of the Federal Government, etc., and to provide representation nationally and internationally.

Additional duties and other obligations include:

- (a) the provision and advice to the Minister of National Health and Welfare on matters of policy relating to research activities of the Department in the Welfare Field.
- (b) he has served as Chairman of the Committee of Experts on Social Security of the International Labour Organization and Chairman of the Social Commission of the United Nations.
- (c) he is concerned with the conduct of the fitness research program under the Fitness and Amateur Sports Act.
- (d) he is concerned with the conduct of the research program under the National Welfare Grants Program.
- (e) he is concerned with the conduct of socio-economic research carried out by the Research and Statistics Directorate.
- (f) he co-ordinates departmental policies relating to research activities with the Deputy Minister of Health.

11.3.1 NATIONAL COUNCIL OF WELFARE

11.3.1.1 Authority

The Council was established late in 1964 under the authority of Section 7 A of the Department of National Health and Welfare Act. It has a broad mandate to advise and assist the Minister of National Health and Welfare in relation to his responsibility for social security and social welfare matters under federal jurisdiction.

Chaired by the Deputy Minister of National Welfare, the Council also includes the ten provincial Deputy Ministers of Welfare and ten other persons appointed for three years by the Governor-in-Council.

11.3.1.2 Activities

Since its inception the Council has met four times to discuss federal welfare legislation, shared provincial programs and related areas of concern, such as manpower and research requirements of the welfare field and ways of achieving effective collaboration between the governmental and voluntary sectors. Needs of the aged, welfare aspects of the correctional field and appeal procedures under income maintenance programs have also engaged the Council's attention. At its last meeting there was considerable discussion about the structure and function of the Council, and suggestions were made which are still under study by the Department.

- 11.3.2 THE NATIONAL ADVISORY COUNCIL ON FITNESS AND AMATEUR SPORT.
- The Minister of National Health and Welfare is advised on policy matters by the National Advisory Council on Fitness and Amateur Sport. The Council consists of 30 persons appointed for terms of up to three years, chosen for their interest and experience in activities supported by the program. At least one member must come from each province. Council membership includes persons with experience in national and international competition, physical educators, physicians, leaders in community recreation, and others whose special experience can be an asset to its work. The Council, in its capacity as the Minister's principal advisor, carries on a continuing study of progress made under the program. It examines applications for grants and makes recommendations on them. It maintains continual liaison, through committees, with national agencies concerned with amateur sport, fitness and recreation.

11.4 HEALTH SERVICES BRANCH

11.4.1 Objectives

The Health Services Branch, one of four Branches of the National Health Organization under the direction of the Deputy Minister of National Health, is organized to promote, preserve and improve the health of Canadians. It is the part of the Health Organization primarily concerned with Health Protection. Authority is provided mainly by the Department of National Health and Welfare Act but includes certain duties arising from the Atomic Energy Control Act, the Blind Persons Act, the Food and Drugs Act, the Civil Emergency Measures Planning Order, the Disabled Persons Act, the Canada Pension Plan, the Shellfish Certification Agreement, the Potable Water Regulations and the National Health Grants Regulations.

11.4.2 Functions and Organizations(a) Functions

The principal functions of the Health Services Branch are:

- (1) the provision of consultant and advisory services;
- (2) the development of references, standards and guides;
- (3) the development and distribution of informational materials and the provision of training services;
- (4) the planning, conduct and assessment of public health research and studies, especially in relation to problems of an operational, developmental or administrative nature, or related to Health Grants;
- (5) the development, conduct and evaluation of surveillance and monitoring services.

These functions are carried out in collaboration with provincial health departments. They also involve cooperation and consultation with appropriate professional organizations and voluntary agencies. Advisory and expert committees assist on a continuing or ad hoc basis.

In addition, the Health Services Branch has duties that arise from references on water and air pollution from the International Joint Commission, and others related to the inter-

national health programs of such agencies as the World Health Organization, the Food and Agriculture Organization, the International Labour Office, and the International Atomic Energy Agency.

(b) Organization

The Health Services Branch is organized into four main functional areas (see organization chart attached). The first of these is Child and Adult Health within which the Child and Maternal Health, Dental Health, Mental Health and Nutrition Divisions and Consultants on Health Education and Smoking and Health are concerned with measures designed to promote individual or personal health. The Divisions included in the Environmental Health and Laboratory Services area, i.e. the Occupational Health Division, the Public Health Engineering Division, the Radiation Protection Division and the Laboratory of Hygiene, are especially interested in environmental micro-biological and other external or non-personal factors that may affect the health of Canadians. Rehabilitation encompasses Prosthetic Services, Disability Assessment, Medical Rehabilitation Consultation and Blindness Prevention. Emergency Health Services involve advice to the provinces, the training of emergency health workers, and the provision and positioning of emergency hospitals and other health supplies across the country.

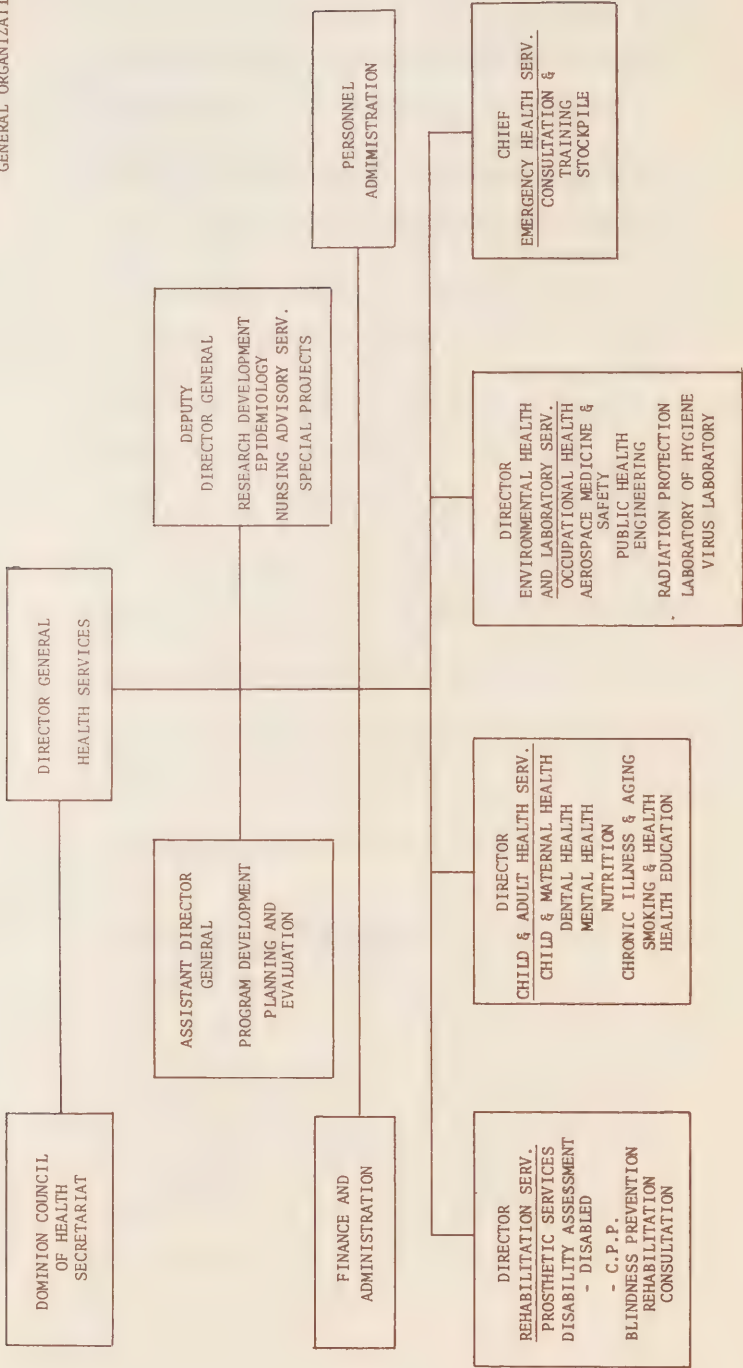
11.4.2.1

Administration, Planning and Evaluation and Program Development - Concluding Remarks

The Health Services Program is under the direction of a Director General who has a Deputy Director General with specific responsibility for Research Development, Epidemiology, and Nursing Consultation, which apply to the program as a whole; a senior staff officer, Assistant Director General for program development, planning and evaluation; and Administrative Officers for financial and personnel matters. As indicated, the Branch as a whole is responsible for a

wide variety of activities which include a large measure of research, statistical and scientific and technical information components. Development in these specific areas of scientific activities with which the Health Services Branch is especially concerned are discussed at greater length in the succeeding sections of this Brief dealing with the relevant functional units of this Branch.

NATIONAL HEALTH AND WELFARE
HEALTH SERVICES BRANCH - 1
GENERAL ORGANIZATION



11.4.3 Research Development11.4.3.1 Authority

Authority for the establishment and operations of the Research Development unit is provided in the Department of National Health and Welfare Act (1944-45), Section 5, which stipulates that "The duties, powers and functions of the Minister extend to and include... particularly the following matters...(b) investigation and research into public health and welfare...."

Additional authority is also contained in "The General Health Grants Rules for funds to be granted to investigators and administered by the Provinces for public health research."

11.4.3.2 Historical Development

The Public Health Research Grant, designed to stimulate and develop Public Health Research, was established in 1948 in an amount of \$100,000 and was increased by \$100,000 per year to a maximum of \$500,000. This amount soon proved to be inadequate and the terms of the other grants (except hospital construction and training) were revised to permit research to be carried out. Thus, during the 1950's research in Health was supported by other grants such as the Mental Health Grant, the Tuberculosis Control Grant, the Public Health Grant, the Maternal and Child Health Grant, etc.... Hence, expenditures under the Public Health Research Grant in the early years represent only part of the total support that was given to various kinds of Public Health Research.

In 1960-61, the Public Health Research Grant was more than tripled from \$500,000 to \$1,744,200 and was placed on a basis of 10¢ per capita. Its annual total thereafter increased with the growth of Canada's population. In the fiscal year 1965-66 the grant was again increased to \$4,425,510 (23¢ per capita) and the rules were revised to bring all research but not all processing under this agent.

In 1967-68 the processing of research grants for all sub-committees of the Public Health Research Advisory Committee was done for the first time by the Research Development Section.

The Public Health Research Grant is unique in two respects:

- (1) It is not allotted on a Provincial basis but on the merit of the applications;
- (2) Recommendations as to approval or rejection of the projects are made to the Minister by a Committee of the Dominion Council of Health (Public Health Research Advisory Committee) after a careful review by expert appraisers from both outside and within the Department and by sub-committees composed of experts drawn from every part of Canada.

11.4.3.3

Purpose of the Public Health Research Grant

The grant is intended to promote and maintain a working partnership between the Federal and Provincial governments for the promotion of health by supporting research (including demonstrations) pertaining to health care and to health service programs with special relation to Canadian health needs and to provincial and federal health services.

11.4.3.4

Functions and Responsibilities of the Research Development Section

The Research Development Section processes the grant applications and advises the National Health Grants Section concerning applications for research assistance under the Public Health Research Grant basing its advice on consultations with departmental experts and appraisals of research applications by non-departmental experts as well as interviews with the recipients of research grants in respect of technical aspects of their research work.

11.4.3.5

Scope of the Grant

11.4.3.5.1

General

This pooled Grant which is voted annually is not allotted in specified amounts for each province, although applications are submitted through the province. It is normally used for research in the national interest.

Projects likely to be approved must show a direct relationship to the following aspects of public health:

- (a) Prevention of disease, disability or death,
- (b) Epidemiological studies,
- (c) Hospital studies (for example, administrative),
- (d) Community based studies in health and medical care,
- (e) Operational research,
- (f) Environmental health, including sanitation,
- (g) Training and utilization of health manpower resources.

Excluded from the Public Health Research Grant will be most research in medical sciences (either basic or clinical), unless there is a direct and early preventive aspect or some special relationship to the seven areas mentioned above and detailed below. Also excluded are clinical studies which are an integral part of hospital care and thus shareable under the Hospital Insurance and Diagnostic Services Act.

11.4.3.5.2

Specific Support

- (a) Studies leading to Prevention of Disease or Disability or Death, particularly when any results obtained could be applied at once rather than requiring further research before utilization is feasible. Preventive medicine has customarily used principles such as discovering and removing causes, interrupting transmission to and increasing the resistance of the host. Additional approaches to current public health problems may be needed. In the field of mental health, the prevention of mental illness and behavioural disorders may include:

- efforts to arrive at definition and quantification,
- measures to improve utilization of scientific and technologic knowledge,
- studies on environmental influences.

In the field of child and maternal health, prevention shall be considered to include, among other things, studies related to reducing congenital anomalies, as well as to measures that will reduce perinatal and maternal morbidity and mortality.

In the field of dentistry some clinical research may be included.

Medical Rehabilitation will be considered to include measures that

- i) prevent further deterioration,
 - ii) restore function.
- (b) Epidemiological studies of diseases and conditions which are of general public health importance, including studies leading to the assessment of current health problems and their trends. Studies in the natural history of disease would also be appropriate.
- (c) Hospital based studies particularly those which deal with the problem of improving the care of patients through new administrative and organizational techniques. Research in the utilization of computers is included in the above.
- (d) Community based studies in the delivery and utilization of medicare services as well as studies in community health care programs such as those sponsored by health units. Morbidity surveys, home care, immunization programs are among the activities contemplated.
- (e) Operational or administrative research, (in addition to (c) and (d) above, on health programs and services and on the quality of health care provided by them. Studies would include an evaluation of services provided by public health laboratories, by any level of government, by community agencies, by medical care insurance or by dental practitioners.
- (f) Studies aimed at finding solutions for problems in the field of Occupational Health, Air Pollution, Sanitation, Public Health Engineering and Water Pollution.
- (g) Studies on the Training and Utilization of Health Man-power Resources such as physicians, nurses, dentists, pharmacists, physical and occupational therapists, medical sociologists, etc.

- (h) Research Positions in Epidemiology, Biometrics or Biostatistics for Departments of Preventive Medicine. The Public Health Research Grant can provide funds to university departments of Preventive Medicine or Dentistry for agreed programs of research, coordinated by a single senior individual. These funds can therefore support promising individuals who plan to make a career in the epidemiological, biometrical or biostatistical aspects of health research.

11.4.3.6

Appraisal System

- (1) Criteria for appraisal of application are provided on an appraisal form and include -
- i) the investigator's familiarity with relevant literature,
 - ii) the likelihood of the research to make a contribution to scientific knowledge (relevance),
 - iii) the design of the research (merit).
- (2) The Principal Investigator is usually sponsored by a University Department, Health Unit, Hospital or other agency which co-signs the application. The applicant is requested to list five best or most representative publications, preferably in the field of the present project.
- (3) The Internal Appraiser is usually the chairman of one of the subcommittees of the Public Health Research Advisory Committee but may also be a departmental consultant not having anything to do with a research committee. Departmental appraiser recommends one or more external appraisers following their review of a research project.
- (4) The External Appraiser who may be academic, industrial or provincial people are contacted upon the recommendation of the internal appraiser and asked to critically review a research application. The research proposed in the application is related to the field in which the external appraiser works. When such an appraisal is completed it is returned to the Research Development Section.

(5) The Subcommittees are formed under the authority of the Public Health Research Advisory Committee and are responsible to it. They are formed to consider specialized areas of research and to advise the Public Health Research Advisory Committee on how to use the appraisals and other relevant information in assigning priorities to the applications so as to assist in the final disposition of the funds available. At this point the relation of the proposed research to lessening the burden of disease and its relevance to provincial and national programs may also be considered. In addition the subcommittees are charged with the responsibility of assessing the scientific merit of the research projects from the point of view of design, methodology, hypothesis testing, soundness of concept and applicability to the solution of health problem.

(6) The Public Health Research Advisory Committee
All subcommittees report their recommendations to the Public Health Research Advisory Committee which is a committee of the Dominion Council of Health. This committee was established not only to act for the Dominion Council of Health in advising the Department on what projects to approve, but also to recommend areas that need development, and methods that might be used to stimulate such development. It takes a broad interest in advancing the whole field of public health. This purpose would include consideration of the apportionment of funds available among the various branches of public health. Allocation of funds for research projects under the Public Health Research Grant is the prerogative and responsibility of the Public Health Research Advisory Committee of the Dominion Council of Health.

In practice this Committee has had to review the merits and relevance of many projects with little time being available for broader issues. With consolidation of research funds, procedures must be found to permit the

Committee to give adequate time to such general discussion. Its membership must be considered in relation to this broader function.

In composition the Committee must have representation from the areas of special interest, because the Committee's collective advice is needed on apportionment of funds among these and other subjects of research.

Some of these areas are well-represented by a Departmental Consultant, but others (e.g. Cardiology) are not, at present, so represented. Some relationship with the Subcommittee concerned is desirable so that an understanding of points of view may be developed between each group and the main Committee. Each Subcommittee is asked to designate a spokesman (possibly but not automatically, its Chairman). For review procedure, see table shown on next page of this Brief.

11.4.3.7 Utilization of the Grant

In the following Tables, the amounts recommended under the Public Health Research Grant for 1968-69 are shown by Departments of University, Hospitals, etc., fields of investigation and by Classification of Diseases.

(See Tables I, II and III).

11.4.3.8 Allocation of funds by disease category.

11.4.3.8.1 Cancer Research

The customary block grant \$350,000 was allocated to the National Cancer Institute in 1968-69. Other cancer projects amounted to \$68,000.

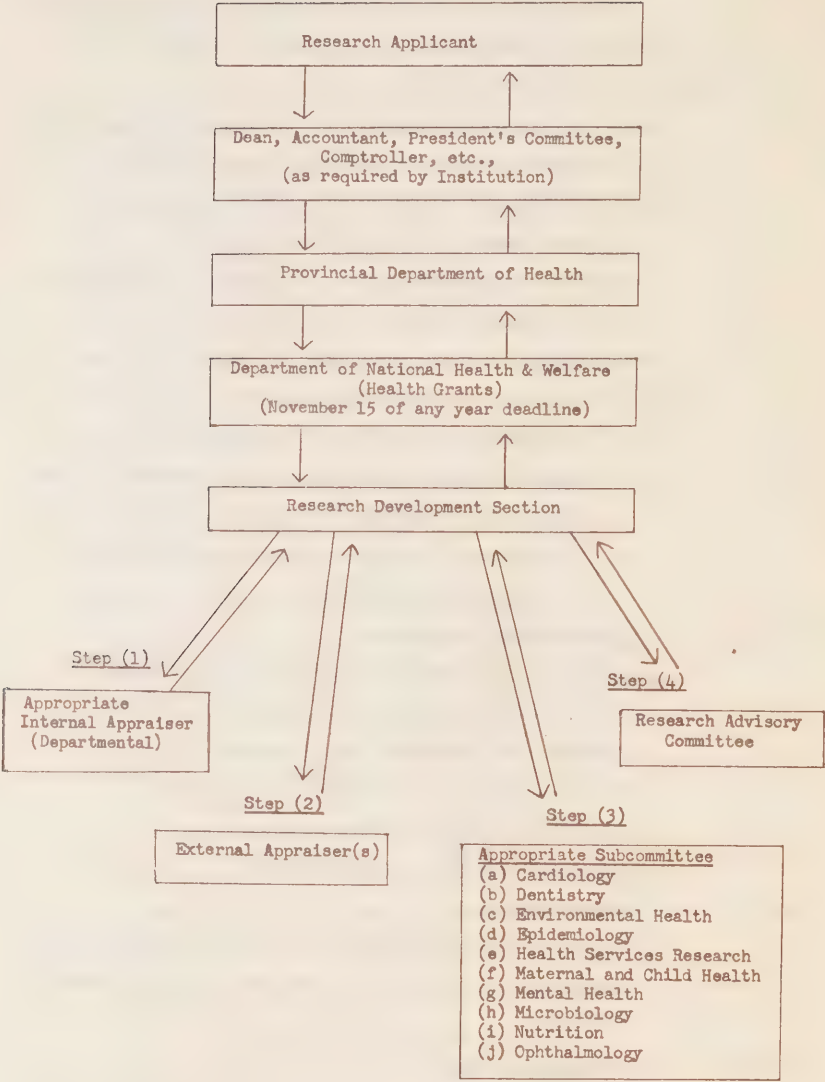
11.4.3.8.2 Cardiology Research

In 1968-69 just over \$100,000 was granted in this area, about half that of the previous year; a further indication that basic research is being released from the purview of the Public Health Research Fund.

11.4.3.8.3 Poliomyelitis Research

The most significant projects now deal with research on the development and production of Sabin oral polio virus and on its safety.

Special Committee



11.4.3.8.4

Tuberculosis Research

Support in 1968-69 for about \$120,000 was chiefly for epidemiological studies.

11.4.3.8.5

Dental Health Research

In 1968-69 more than \$200,000 was allocated for Dental Health research. While the effectiveness of preventive measures remains the objective of much dental research, support is given for studies on growth and development, as well as for surveys to define the scope of dental health problems in this country.

11.4.3.8.6

Environmental Health Research

Due to increasing awareness of pollution and other environmental problems, applications for research in this area were sufficient in number to establish a separate subcommittee; more than \$350,000 was allocated in 1968-69.

11.4.3.8.7

Health Services Research

From modest beginnings three years ago, this area of research claimed about \$750,000 of the 1968-69 Public Health Research Grant. To facilitate committee work in this broad area of research, projects were grouped as community, nursing, medical education and hospital based studies; the last named encompassing automation, utilization and paediatrics.

11.4.3.8.8

Maternal and Child Health Research

Administration of Public Health Research Grant funds allocated in the area of Maternal and Child Health is now carried out by the Research Development Section.

11.4.3.8.9

Mental Health Research

More than 25% of applications for public health research funds 1968-69 were in the field of Mental Health.

11.4.3.8.10

Nutrition Research

Several regional studies in the important area of Nutrition were allocated funds on the stipulation that methods employed be co-ordinated in order to validate results on a national basis.

11.4.3.8.11

Ophthalmology Research

While there were too few projects submitted to call a meeting of the pertinent subcommittee, support for Ophthalmology research increased to \$135,000 for 1968-69.

11.4.3.8.12

Research Positions in Epidemiology, Biometrics and Biostatistics

These university positions in departments of Preventive Medicine or Dentistry are for those who intend to make a career in the epidemiological, biometrical or biostatistical aspects of Health Research, and are intended; (a) to relieve the present shortage of trained epidemiologists in Canada and (b) to improve the quality of statistical control and analysis of research projects. In 1968-69, eleven applicants were granted in all more than \$200,000.

TABLE I
DEPARTMENT OF NATIONAL HEALTH AND WELFARE
RESEARCH UNDER THE PUBLIC HEALTH RESEARCH GRANT 1968-69
AMOUNTS RECOMMENDED FOR APPLICATIONS, AT FEBRUARY 15, 1968
CATEGORY "A" BY DEPARTMENT OF UNIVERSITY, HOSPITAL, ETC.

Code No.	DEPARTMENT	No.*	Amount \$	% of TOTAL
1	Allergy.....	--	--	--
2	Anaesthesia.....	1	3,454	0.1
3	Anatomy.....	1	4,500	0.1
4	Bacteriology.....	--	--	--
5	Biochemistry.....	1	19,325	0.5
6	Biology.....	--	--	--
7	Biomedical Engineering.....	5	81,400	2.0
8	Biophysics.....	--	--	--
9	Chemistry.....	--	--	--
10	Clinical Investigation Unit.....	3	79,717	1.9
11	Dentistry.....	14	135,576	3.3
12	Endocrinology.....	--	--	--
13	Genetics.....	1	7,500	0.2
14	Gynaecology.....	--	--	--
15	Haematology.....	--	--	--
16	Histology, Embryology.....	--	--	--
17	Laboratory (Hospital).....	5	50,161	1.2
18	Medical Jurisprudence and Ethics.....	--	--	--
19	Medical Research Institutes.....	10	656,169	16.1
20	Medicine.....	14	164,263	4.0
21	Microbiology.....	9	84,256	2.1
22	Neurology and Neurosurgery.....	--	--	--
23	Nursing.....	1	3,000	0.1
24	Nutrition.....	4	32,034	0.8
25	Obstetrics.....	8	111,124	2.7
26	Ophthalmology.....	9	104,133	2.6
27	Otolaryngology.....	1	24,861	0.6
28	Paediatrics.....	17	241,191	5.9
29	Parasitology.....	2	25,600	0.6
30	Pathological Chemistry.....	--	--	--
31	Pathology.....	--	--	--
32	Pharmacology.....	3	36,902	0.9
33	Pharmacy.....	3	41,653	1.0
34	Physiology.....	1	15,592	0.4
35	Physiological Hygiene.....	1	30,470	0.8
36	Physical Medicine, Rehabilitative Medicine.....	1	4,400	0.1
37	Physics.....	--	--	--
38	Psychology.....	29	301,697	7.4
39	Psychiatry.....	16	192,419	4.7
40	Public Health, Social and Preventive Medicine.....	46	950,933	23.3
41	Radiology.....	--	--	--
42	Schools of Hygiene, Nursing, etc.....	11	187,953	4.6
43	Social Work.....	--	--	--
44	Sociology, Anthropology.....	1	8,000	0.2
45	Speech Pathology, Audiology.....	1	14,320	0.3
46	Surgery.....	1	68,875	1.6
47	Zoology.....	--	--	--
48	Other Departments.....	25	405,881	9.9
	TOTAL	245	4,087,359	100.0

* Number of applications.

Research Development Section, February 15, 1968.

TABLE II
DEPARTMENT OF NATIONAL HEALTH AND WELFARE
RESEARCH UNDER THE PUBLIC HEALTH RESEARCH GRANT 1968-69
AMOUNTS RECOMMENDED FOR APPLICATIONS, AT FEBRUARY 15, 1968
CATEGORY "B" BY FIELD OF INVESTIGATION

Code No.	Field	No.*	Amount \$	% of Total
1	Allergy.....	--	--	--
2	Anaesthesiology.....	--	--	--
3	Anatomy.....	3	14,004	0.3
4	Anthropology.....	1	35,000	0.9
5	Bacteriology.....	8	157,261	3.9
6	Biochemistry.....	9	93,626	2.3
7	Biomedical Engineering.....	1	15,900	0.4
8	Biophysics.....	--	--	--
9	Dentistry.....	14	124,530	3.1
10	Dermatology.....	--	--	--
11	Endocrinology.....	1	7,000	0.2
12	Environmental Medicine, Industrial Health, Toxicology.....	14	249,474	6.1
13	Epidemiology, Biostatistics.....	19	291,695	7.1
14	Genetics.....	3	35,245	0.9
15	Gerontology.....	--	--	--
16	Gynaecology.....	--	--	--
17	Haematology.....	2	26,972	0.7
18	Immunology, Serology.....	3	88,174	2.2
19	Medicine.....	2	34,000	0.8
20	Medical Administration and Education.....	20	287,812	7.0
21	Neurology, Neurosurgery.....	5	75,334	1.8
22	Obstetrics.....	9	134,213	3.3
23	Ophthalmology.....	10	131,630	3.2
24	Otorhinolaryngology.....	3	45,248	1.1
25	Paediatrics.....	7	99,078	2.4
26	Parasitology, Mycology.....	4	44,925	1.1
27	Pathology.....	2	83,186	2.0
28	Pharmacology, Therapeutics.....	4	39,359	1.0
29	Physical Medicine, Rehabilitation.....	6	256,181	6.3
30	Physiology, Metabolism.....	4	34,728	0.9
31	Preventive Medicine.....	2	34,111	0.8
32	Psychiatry.....	26	340,297	8.3
33	Psychology.....	31	299,505	7.3
34	Radiobiology.....	--	--	--
35	Radiology.....	--	--	--
36	Sanitary Engineering.....	8	88,780	2.2
37	Social Medicine, Sociology.....	11	387,726	9.5
38	Surgery.....	1	16,433	0.4
39	Virology.....	11	165,932	4.0
40	Unclassifiable.....	1	350,000	8.5
	TOTAL	245	4,087,359	100.0

* Number of applications.

Research Development Section, February 15, 1968.

TABLE III
DEPARTMENT OF NATIONAL HEALTH AND WELFARE
RESEARCH UNDER THE PUBLIC HEALTH RESEARCH GRANT 1968-69
AMOUNTS RECOMMENDED FOR APPLICATIONS, AT FEBRUARY 15, 1968
CATEGORY "C" BY CLASSIFICATION OF DISEASES

Code No.	Class of Disease	No.*	Amount \$	% of Total
1	Infective and Parasitic Diseases.....	25	466,500	11.4
2	Neoplasms.....	2	418,186	10.2
3	Endocrine System, Nutritional and Metabolic Diseases.....	12	148,009	3.6
4	Diseases of the Blood and Blood-forming Organs.....	2	13,000	0.3
5	Mental Disorders.....	40	482,286	11.8
6	Diseases of the Nervous System and Sense Organs.....	27	341,400	8.4
7	Diseases of the Circulatory System...	5	61,370	1.5
8	Diseases of the Respiratory System...	7	89,935	2.2
9	Diseases of the Digestive System.....	13	133,230	3.3
10	Diseases of the Genito-Urinary System.....	--	--	--
11	Complications of Pregnancy, Child-birth and the Puerperium.....	7	107,136	2.6
12	Diseases of the Skin and Subcutaneous Tissue.....	--	--	--
13	Diseases of the musculo-skeletal system and Connective Tissue.....	3	101,550	2.5
14	Congenital anomalies.....	7	175,350	4.3
15	Certain Causes of Perinatal morbidity and mortality.....	2	46,314	1.1
16	Symptoms and Ill-defined Conditions..	3	67,527	1.7
17	Accidents, Poisonings, and Violence -E- (external cause).....	2	31,610	0.8
	Accidents, Poisonings, and Violence -N- (nature of injury).....	3	23,827	0.6
18	Diverse Disease Entities.....	23	551,078	13.5
19	No Disease Entity Involved. Administration (Hospital, Medical, Public Health, Education) is included here.....	62	829,051	20.2
	TOTAL	245	4,087,359	100.0

* Number of applications.

Research Development Section, February 15, 1968.

11.4.4 Epidemiology11.4.4.1 Objectives of the Division

The purpose of the Epidemiology Division is to provide an epidemiological service at the national level. The scope of this service is best described by a definition of epidemiology as "the science concerned with factors and conditions which determine the occurrence and distribution of health, disease, defect, disability, and death in populations".

Objectives

The objectives of the Epidemiology Division are:

- (a) the definition of disease and other public health problems employing epidemiological methods of study;
- (b) the prevention and control of disease through the design and assessment of appropriate public health programs;
- (c) the coordination and most effective development of epidemiological services in Canada.

11.4.4.2 Scientific activities

The Epidemiology Division advises the Department and other agencies about factors governing disease causation in population groups and their possible control. These include causal relationships of a genetic, social or environmental nature. The analysis and interpretation of disease distribution in terms of time, place, person, etc., may reveal significant relationships between the factors involved, and result in the formulation of hypotheses which can be tested by experiment or research with the ultimate aim of developing preventive measures at a community level, but with defined roles for local, provincial and federal groups. While the prevention and lessening of diseases may have to proceed and form the basis for some activities of the Health Services Branch without complete study and testing, yet the aim of the Epidemiology Division is a full understanding of diseases of particular importance to Canadians. Such an understanding gives the Division a key role in collecting all available information about diseases, analysing them and suggesting feasible action.

A similar role, for collection and analysis of data and conduct of studies, is played by many consultants throughout the Department and by provinces and other agencies. Such surveillance activities become meaningful in public health when they utilize epidemiological methods and analysis. The Epidemiology Division therefore provides consultation on epidemiological matters, and assistance in experimental design to other divisions of the Health Services Branch, and executes, coordinates or cooperates in epidemiological studies. By providing advice and consultation to provincial health departments and other agencies, as well as to the federal department, the Epidemiology Division helps to develop programs which will lessen the burden of disease in Canada.

Surveillance of infectious diseases is also carried out to detect unusual disease prevalence, and through its field unit, assistance is provided the provinces in dealing with epidemics. Areas of special concern are briefly outlined under the following headings:

11.4.4.2.1 Disease Surveillance - Epidemiological Bulletin

The Division maintains surveillance of infectious and non-infectious diseases and disability in Canada and other countries. Current information of particular epidemiological interest to Canada is published monthly in the "Epidemiological Bulletin". This is a restricted publication which provides current information to medical officers of health, public health laboratory workers and other practitioners.

11.4.4.2.2 The Division assists provincial departments of health in venereal disease control chiefly through health grants, and by providing educational materials.

11.4.4.2.3 The Division is also closely associated with the activities of the Traffic Injury Research Foundation of Canada and the Canada Safety Council. The chief function of the Safety Council is to promote safety education. The primary purpose of the Research Foundation is to stimulate and coordinate research

into the medical aspects of traffic accidents. The Division studies accident statistics to determine the nature and causation of injury, and to pinpoint susceptible groups involved. This provides a basis for appraisal of applications for accident research projects leading to improved accident control measures.

11.4.4.2.4 Control of Tuberculosis

The Division conducts epidemiological studies, provides a consultant service, and assesses applications for national health grant support.

11.4.4.2.5 Field Study Unit

The recent establishment of a field study unit permits the Division to give assistance to provincial departments of health in the investigation of disease outbreaks and assessment of disease control measures. This unit also assists other Divisions of the Department of National Health and Welfare in the field aspects of epidemiological studies initiated by them.

Ex: Biological effects of asbestosis.

11.4.4.2.6 Canadian Study on Smoking and Health

In 1955 a long-term study was initiated by the Department of National Health and Welfare with the cooperation of the Department of Veterans Affairs, to investigate the relationship between smoking habits and mortality from chronic diseases, particularly lung cancer. The information collected during the course of this survey is now being utilized to determine the possible relationship between pre-existing lung diseases such as chronic bronchitis and the subsequent development of lung cancer. This project is being carried out jointly by this Department, the Department of Veterans Affairs and the University of British Columbia. Statistical analysis has been conducted, and a report is in preparation.

11.4.4.2.7 Studies of Local Health Services

In 1963, the Division assisted the Canadian Public Health Association in a cooperative study of functions and activities of all public health personnel in two large health units. Analysis of the data was completed, and a report published during 1967.

11.4.4.2.8 Advisory Committee on Epidemiology

The Advisory Committee on Epidemiology was established in 1962. Membership includes epidemiologists from provincial departments of health and Canadian universities, and other consultants. The purpose of the Committee is to advise on matters relating to the study and control of communicable and non-communicable diseases including chronic illness, and to assist in development of the most effective epidemiological services for the benefit of the country as a whole. The Committee met once during the year 1967-68 to consider agenda items which included: rheumatic fever prophylaxis; salmonellosis in foodstuffs; gamma globulin prophylaxis for rubella; psittacosis legislation; viral hepatitis; a leprosy register; revision of surveillance procedures (cholera, smallpox); epidemiological services in chronic disease, and air pollution.

11.4.4.2.9 National Advisory Committee on Immunizing Agents

The National Advisory Committee on Immunizing Agents met to review reported reactions to measles vaccines, to study results of experimental trials of both killed and live vaccines, and to make recommendations on the preferred type and immunization schedule. At the present time the evidence is overwhelming that the use of live attenuated measles vaccine alone is a safe, and the preferred method for the elimination of measles in the population.

11.4.4.2.10 Technical Information Section

The Technical Information Section provides information for support of Divisional programmes and research. It also provides information requested by other divisions and public health agencies. This amounts to as many as 10 divisional requests for information per day and approximately 100 reference lists, bibliographies and literature reviews were made during the last fiscal year. In the process of development of information resources in specialized areas, over 700 new documents were accessioned during that same period.

11.4.4.2.11 Teaching Activities

Consultants in the Division lecture on request at a number of universities, on subjects of epidemiological importance at both the undergraduate and postgraduate level.

11.4.4.2.12 National Health Grants

The Division undertakes field visits and reviews applications for national health grants in the following areas: tuberculosis control; venereal disease control; accidents; the epidemiology of chronic disease, and epidemiological research projects.

11.4.5 Health Education11.4.5.1 Conceptual Definition

Health education has been defined as a "process of change within the human organism itself which is related to achieving personal and community health goals." It is conceived as a "dynamic everchanging process of development in which a person is accepting or rejecting new information, new attitudes and new practices concerned with the objectives of healthful living".¹

11.4.5.2 Scientific Activities of the Health Education Unit

The Health Education Unit of the Department is engaged in two classes of scientific activity: scientific information and education in the health field.

Scientific information refers to the acquisition and dissemination of scientific and technical information in matters of health.

Education is carried out mainly through extension and technical advisory services to provincial health authorities and other health agencies, on request.

The Health Education Unit is one of seventeen units which compose the Health Services Branch.

The responsibilities for health education, under the National Health and Welfare Act, include "all matters relating to the promotion or preservation of health", "investigation and research into public health", the "collection, publication and distribution of information relating to the public health" and "cooperation with provincial authorities with a view to the coordination of efforts made or proposed for preserving and improving the public health".

¹ Nyswander Dorothy "What is Health Education", American Journal of Public Health 37:671, June 1947.

More specifically, the Unit is responsible for the development of references, standards and guides in health education; development and distribution of technical information materials and provision of training services; planning, conduct and assessment of public health research and studies, especially in relation to problems of an operational, developmental or administrative nature, or related to Health Grants in health education; and the development, conduct and evaluation of surveillance and monitoring services in health education.

In addition to its consultative role to the agencies mentioned, the Health Education Unit furnishes consultative services on educational methods and techniques to operational programs directed to the lower socio-economic strata of our society.

This is accomplished through stimulating and conducting research on educational methods and techniques, evaluation of divisional programs and materials, and the provision of consultant and advisory services in health education to the divisions and programs of the Health Services Branch, the provincial departments of health, departmental branches and divisions, other departments and health agencies, industry, and the educational institutions.

11.4.5.3

International Activities

There are no formal agreements regarding scientific activities between this Unit and organizations outside Canada. However, exchange of technical information in health education is in effect with the United States Public Health Service, the World Health Organization, the Central Institute for Research in Health Education of the Union of Soviet Socialist Republic, the International Union for Health Education, the Central Council for Health Education for Australia, the Health Education Division of the New Zealand Department of Public Health, etc.

11.4.5.4

Methods of dissemination

As a means of disseminating scientific health information, the Health Education bulletin is published five times yearly and distributed to over 2,600 key people in the fields of public health and school health. It has the following objectives:

1. To provide public health workers and those engaged in public health education with technical information on:
 - (a) Health education projects carried out by local, provincial and federal public health agencies, universities, etc.;
 - (b) Methods and techniques in health education;
 - (c) Sources of health education materials, films, filmstrips, and other audio-visual aids.
2. To stimulate public health workers to apply recent research findings to various programs with a view to increasing their program's effectiveness.

Extramural research findings are communicated via technical publications, special monographs and through the cooperation of professional agencies such as the Canadian Health Education Specialists Society.

External research is reported in the Health Education bulletin. Bibliographies on topics such as drug abuse have been prepared by the Unit, and one on Family Life is currently on the project files. In cooperation with other agencies, the Consultant in Health Education was responsible for the introduction of Smoking and Health, as well as Drug Abuse, in the curricula of the provincial Departments of Education.

Special Committee

11.4.6 Smoking and Health Program

11.4.6.1 Organization and Responsibilities

The operation of this program is the responsibility of the Medical Consultant, Smoking and Health Unit, Office of the Director General, Health Services Branch, Department of National Health and Welfare.

The Medical Consultant reports to the Director General of the Health Services Branch and is responsible for the initiation and implementation of all program activities designed to achieve the following objectives:

- (1) To promote the mental and physical health and general well-being of Canadians.
- (2) To prevent disease, disability and death and thereby reduce the drain on human and financial resources, attributable to cigarette smoking.
- (3) To inform Canadians convincingly of the health hazards of cigarette smoking.
- (4) To assist Canadians to avoid or reduce the health hazards of cigarette smoking.

11.4.6.2 Scientific Activities

Research is arranged by direct contract between the Department of National Health and Welfare and various universities or other organizations. Literature review and statistical research is also carried out with the assistance of other units of the Department or by members of the program staff. Research grants have been made to chemists, physicians, sociologists, teachers, statisticians, special interest organizations, public health groups and others. Research into some of the pharmacological aspects of cigarette smoking may become necessary in the very near future.

11.4.6.3 Advisory Committees

The only committee concerned with the scientific aspects of cigarette smoking is: "The Committee on Research Concerning Smoking Hazards".

This committee consists of physicians, sociologists, psychologists, epidemiologists, an authority on addiction, a

health educator and a consultant on communication techniques.

The members are drawn from all parts of Canada and from the Department of National Health and Welfare.

This committee advises the Department as required, on research matters arising from the activities of the Departmental Smoking and Health Program.

11.4.6.4 Scientific and Technical Information

Information in this category is supplied in the form of health education materials, in the form of written replies to specific questions or in the form of reports respecting specific research projects.

These are made available as follows:

11.4.6.4.1 Scientific and Technical Information

- Smoking and Health Reference Book (Canada)
- Resource Guide on Smoking and Health for Canadian Teachers
Grades 5 - 13
- Posters
- Pamphlets
- Desk card - for doctors and others
- No smoking signs
- Card for hospital patients
- Advertisements in magazines for high school students and
parent-teacher groups
- Radio programs
- Television clips
- Films
- Filmstrips
- Slides
- Educational television programs
- Exhibits
- Press releases
- Press fillers
- Smoking and health bulletins

11.4.6.4.2 Materials Reproduced or Purchased and Distributed by the Department.

- Medical Bulletin on Tobacco
- National Interagency Council (U.S.) Newsletter
- Smoking and Health Bibliography
- Reprints of press magazine and journal articles

Reports of Smoking and Health Research Projects and Studies

- Annual Surveys of Canadian Smoking Habits by D. B. S., supported as additional questions to Labour Force Survey
- Surveys of knowledge and attitudes about smoking hazards
- Surveys of changes in Smoking habits and kinds of cigarettes smoked, contracted
- Evaluations of health education materials and techniques
- Literature reviews
- Experimental health education programs among children and adults
- Experimental smoking withdrawal clinics
- Survey of cigarette advertising
- Estimates of costs of smoking to the economy
- Studies of aversive conditioning
- Surveys of the psychological and social factors associated with smoking
- Annual reviews of changes in smoking-related diseases
- A study of tar and nicotine levels in the smoke of Canadian cigarettes combined with a study of the possibility of identifying and removing certain harmful substances in cigarette smoke.

11.4.7 Chronic Illness and Aging11.4.7.1 Authority

General authority for the establishment of this unit is provided for in Section 5 of the Department of the National Health and Welfare Act.

11.4.7.2 Functions and responsibilities

As a member of the Health Services Directorate, the Consultant in charge of that unit is expected to serve as a resource person in the broad field of Chronic Disease and the Medical Problems of the Aged, available to all sections of the Department, other federal departments and to outside agencies.

11.4.7.3 Scientific Activities

This unit is relatively new, but it is believed that the direct involvement of the Consultant in meaningful scientific activity programs in the field of Chronic Disease is essential and will have a double benefit, both the creation or application of new knowledge and the augmentation of the potential for consultation.

The scientific activities of the Consultant in Chronic Disease and Aging have included his functioning as:

- a) An internal appraiser of public health research grants;
- b) Departmental representative to the National Cancer Institute;
- c) An informal member of the Research Advisory Committee for Fitness and Amateur Sport;
- d) A source of scientific and technical information for international, federal and provincial governmental agencies and the practising profession;
- e) A participant in the Postgraduate Refresher Course at Toronto School of Hygiene.

11.4.7.4

Coordination

The importance of close collaboration with professional groups, universities, voluntary agencies, and provincial departments can scarcely be over-emphasized and a beginning in this direction has already been made. The Consultant was the co-ordinator of the National Conference on Epilepsy held in the Brooke Claxton Building, Ottawa, November 7-8, 1966. A synopsis of that Conference appears in Section 11.4.3.2, entitled Conferences in Volume II of this Brief.

11.4.8 Child and Maternal Health Division11.4.8.1 Objectives of the Division

The broad purpose of the division is to reduce maternal, infant and child mortality and morbidity and to promote optimum health of mothers and children, in cooperation with professional health departments, other health agencies and professional groups.

11.4.8.2 Personnel

The division's professional staff consists of the chief, a medical consultant in pediatrics, a nursing consultant and an adviser in health education.

11.4.8.3 Activities relating to Research and the Use of Scientific Information

Because of the nature of its work, consultant and advisory, the division's professional personnel must be in possession of up-to-date scientific information in the field of maternal and child health. Also it must have the expertise to plan and have carried out sound programs for the betterment of the health of Canadian families.

Over the years the division has established a core system of processes for receiving and imparting pertinent scientific data, and information on ways and means of motivating groups and individuals. Care is taken to modify and extend this system as problems and changes affecting family health arise.

The division itself is not actively engaged in the conduct of basic or administrative research. However, intrinsic in its program of national leadership in the field of Maternal and Child Health are the following activities related to research:

- stimulation of research
- setting up of priority needs
- financial support of research projects
- administration of appraisal system for assessment of research applications
- use of research findings in the formulation and application of standards and guidelines

A logical way to describe the scientific activities relating to the conduct, planning, administering or supporting research and development would be to present them within the context of the division's six major functions.

Functions of Child and Maternal Health Division

1. To define standards of service and guidelines in terms of

Canadian problems. To be fully informed and to recognize the implications of (i) indices and criteria for assessment of health status such as vital statistics data, (ii) standards of care, and (iii) recommended patterns of health service, to achieve optimum health potential of mothers and children.

Through its well organized system of broad and deep collaboration with recognized groups involved in specific problems, information on subject matter and methodology is currently obtained. An example is the recently prepared manual "Recommended Standards for Maternity and Newborn Care" for Canadian hospitals. On the recommendation of the Sub-committee on Standards of Care of the Maternal and Child Health Advisory Committee, the division initiated a study to obtain factual information on present day facilities, staffing and procedures related to services for the care of mothers and newborn infants in Canadian hospitals. A specially designed comprehensive questionnaire was developed; by means of this device provincial health department personnel visited 195 hospitals selected by random sample and collected basic data on the present situations in hospital care. This material was studied and used by four ad hoc working groups to draw up guidelines in the main areas. This entire document was reviewed by the country's expert groups in their specific areas of concern.

2. To consult with health departments, voluntary agencies,

professional associations, universities, and other bodies on a national, provincial, or local basis to define maternal and child health problems and to evaluate needs, facilities and services, as well as to advise on the planning of comprehensive programs.

Intra-departmental consultation to Health Insurance and Resources Branch including appraisal and assessment of projects supported under the National Health Grants Program and other programs; Medical Services Branch, Food and Drug Branch as well as other Government Agencies.

Consultation is maintained by means of planned periodic field visits, reporting and follow-up. One effective channel in the communications system is the Maternal and Child Health Advisory Committee to the Minister, established in 1958. It is made up of provincial directors of maternal and child health divisions or other provincial representatives as well as representatives from paediatrics, obstetrics, general practice and nursing. The functions of this committee in general are: to provide an opportunity for exchange of information among provincial maternal and child health divisional heads and other provincial representatives and the Child and Maternal Health Division; to make available to the Department and the Division the counsel of other specialists in obstetrics, paediatrics and nursing, associated with clinical and teaching fields; to study problems of national scope which might engage the attention of the Department and to facilitate co-ordination and exchange of information on problems more appropriately of provincial concern; to define standards of maternal and child care in terms of existing services and qualifications of personnel; and to examine and make recommendations on professional training facilities.

Sub-committees and ad hoc working parties are appointed for specific purposes and dissolved on completion of tasks. The main Sub-committees were Statistics, Standards of Care, Research and the newly organized one on Nursing.

3. To stimulate and participate in training of medical, nursing and other professional personnel in the maternal and child health field.

Consultants act as lecturers and speakers at a number of university schools of nursing, medicine and public health, and are leaders

and resource personnel at seminars, workshops, institutes for related paramedical and community groups. Using health grant funds, courses and institutes for professional personnel are made available.

Presently the Sub-committee on Nursing is engaged in a study among supervisors and head nurses who provide maternity and newborn nursing services in Canadian hospitals. Its aims are to find out the level of preparation attained by their senior nursing personnel, the areas to which they are assigned and the work periods for which they are employed. This data will be used in implementing a recommendation of the Maternal and Child Health Advisory Committee on post basic education programs in maternity and newborn nursing.

4. To conduct a health education program including the preparation of educational materials for lay and professional use.

A well established and maintained system of preparation of new materials and revision of old publications is in operation. Needs are ascertained, priorities in content and presentation are set up in collaboration with professional health leaders and users. A coordinated system is maintained for the production and distribution of health education materials.

By pre-testing and evaluation after distribution, a good and steady feedback of information is received for use in reassessment and redirection of information and approach.

5. Under the guidance of the Expert Committee on the Occurrence of Congenital Anomalies to ascertain the size and nature of the problem of congenital anomalies, including the continuation and extension of a surveillance system on those recognizable at birth, as well as other means of collecting and maintaining current information on incidence, prevalence and epidemiological aspects of this problem in Canada and elsewhere.

6. To stimulate and undertake research in health problems and health service organization for mothers and children.

Financial support of research under the Public Health Research Grant

is provided with the division providing the administrative structure for the outside technical appraisal of applications. At the present time research projects are being supported at about \$625,000 with the numbers gradually increasing from 9 in 1954-55 to over 60 in 1967-68. The nature of research projects receiving support is changing in keeping with the terms of reference of Public Health Research Grant which now emphasizes epidemiologic and administrative research.

The Sub-committee on Research collaborating with related professional groups assists with the formulation of a statement of research needs and priorities in the Maternal and Child Health field. During field visits and at meetings, consultants discuss research needs and encourage investigation and studies on specific problems, for example, perinatal mortality.

11.4.9 Dental Health11.4.9.1 Authority:

The Dental Health Division was established by Order in Council P.C. 120/6357 of October 3, 1945 in the Department of National Health and Welfare. Authority is provided mainly by section 5 of the Department of National Health and Welfare Act but includes certain duties arising from the Civil Emergency Measures Planning Order - P.C. 1965-1041.

11.4.9.2 Objectives:

To promote, preserve and improve the dental health of Canadians.

11.4.9.3 Functions:

The principal functions of the Dental Health Division are:

- 1) The stimulation, planning, conduct and assessment of dental public health research and studies especially in relation to problems of an operational, developmental, administrative or preventive nature, or related to the Health Grants.
- 2) Development, dissemination and use of dental health educational information and materials.
- 3) Development, conduct and evaluation of surveillance services, particularly with regards to the establishment of a National Dental Health Index.
- 4) The provision of consultation and advice, not covered above, to other units within the Department of National Health and Welfare, to other federal departments and agencies, to provincial governments and to national professional and commercial organizations.
- 5) The training of personnel in the dental aspects of Emergency Health Services and in the utilization of new methodology for the gathering and processing of dental data.

11.4.9.4 Staff:

To provide the resources of specialized knowledge required to cover the broad responsibilities of the Division, the staff includes the Chief and three supporting professionals. A small increment of two secretaries and one clerk completes the establishment.

11.4.9.5

Scientific Activities:

The overall aim of many of the following projects undertaken by or stimulated by the Dental Health Division is to develop methods of obtaining information not previously available or to improve the accuracy and reliability of that previously available in particular that needed for a realistic assessment of the dental health and needs of the Canadian population, the current standards of preventive and treatment services being received by the population and the manpower and other resources that will be required to achieve a reasonable standard of dental health in Canada through preventive measures and adequate treatment services.

11.4.9.6

Utilization of Dental Services:

An intra-mural project in co-operation with the Research and Development Directorate to develop and test a methodology to determine the types and proportions of dental services sought by a public without financial barriers to securing service and an adequate supply of services available within their community. This information is not now available, and is required to provide a rational assessment of the demand for services when no financial barrier exists and to estimate the dental manpower requirements to provide a known level of prevention and treatment services.

11.4.9.7

National Dental Health Index - Field Testing of a Methodology:

The division with the co-operation of the Provincial Departments of Health, is conducting a field test on a national basis of the World Health Organization, International Dental Epidemiological Method Series, Manual No. 3, Dental Health Evaluation Level A Survey. The testing and development of a practical methodology for securing dental data of the type required and the training of personnel in its use are necessary first steps toward the establishment of a National Dental Health Index on a continuing basis.

A National Dental Health Index of adequate reliability and sensitivity would supply, among other things, a means of evaluating various dental programs, directed to the maintenance and improvement of the dental health of Canadians. Such a tool for evaluating does not now exist.

11.4.9.8

Attendance at a Dental Office:

The Division with the co-operation of the Labour Force Special Survey - Dominion Bureau of Statistics, is gathering and analysing data upon the proportions of the child and adult population of Canada now utilizing dental services.

The only Canadian data otherwise available are estimates obtained by inference from voluntary returns to questionnaires from approximately 40% of practicing dentists made by the Canadian Dental Association. These estimates were made some five years ago. Current and more accurate data are required to assess the availability of dental services in the various provinces and territories and manpower requirements.

11.4.9.9

Patient's Recall of Dental Visits

At the suggestion of the Division, the Royal Canadian Dental Corps, Department of National Defence, with some assistance from the Research and Statistics Directorate, Department of National Health and Welfare, conducted a test of the above-mentioned factor, to provide assistance in assessing the accuracy of the data secured by the Labour Force Survey on Attendance at a Dental Office.

11.4.9.10

Dental Condition and Treatment Needs of Young Canadian Adults in the Armed Forces:

The Division is providing advice and assistance to the Royal Canadian Dental Corps who are the initiators of this project. Information of this type on young Canadian adults is virtually non-existent. This project will help to fill a gap in the fundamental data required for estimating dental manpower requirements to maintain and improve dental health in the Canadian population. As the data includes socio-economic factors, it is relatable to the general population.

The data is being made available to the division by the Royal Canadian Dental Corps.

11.4.9.11

Dentist's Time Required for the Provision of Specified Services:

The Division provided some technical advice in the analysis of the data from this project initiated and conducted by the Royal Canadian Dental Corps, Department of National Defence. The data secured are of sufficient reliability to be useful in manpower

planning and is available to the Division from the Royal Canadian Dental Corps.

11.4.9.12 An Examination of Dental Treatment Programs in Canada Supported in Whole or Part from Public Resources:

The Division, with the co-operation of the Directors of Dental Health of the Provincial Departments of Health, are assembling information upon the types and locations of such programs, the population eligible to receive services, the proportion of the eligible population receiving services, the range of services provided by the program, and the method of financing the programs. Major gaps in the information have been identified and provincial Directors have been alerted to the desirability of obtaining more complete information on such programs within their provinces. Information of the type described is useful in assessing the availability of dental services to specific population groups with special characteristics.

11.4.9.13 Dental Health Education:

The Division's activities in dental health education provide technical data and the dental public health appraisal of the professional acceptability of existing material and for the development of new material.

This ensures that the public and the profession receive technically accurate information suitable to encourage the improvement and preservation of the dental health and, therefore, the total health of Canadian citizens by promoting an increase in utilization by the community, the family, and the individual, of measures known to be safe, practical and effective in the prevention and control of dental disease.

The material is accepted by the professions of dentistry and Public Health as the major source of dental health education material in Canada as evidenced by the fact that the effective demand from provincial departments grossly exceeds what can be supplied.

11.4.9.14 Emergency Health Services, Dentistry in:

The Division's program in this respect is to provide consultant services and other assistance to Emergency Health Services Division,

to study the role of the dental profession in Emergency Health Services, to recommend ways in which the profession may provide effective co-operation in mass casualty care in disaster, to prepare and provide precis and technical papers, and dental personnel to the instructional staff of Emergency Health Services Division. The Division's program promotes and facilitates the effective utilization of the dental profession in the event of national disaster and the procurement and maintenance of technical dental stores in the Emergency Health Services stockpile, by providing a dental adviser to the Emergency Health Services Advisory Committee and to working parties on programs for undergraduate training in mass casualty care and by acting on behalf of Emergency Health Services as dental adviser to dental faculties in the organization and implementation of pilot programs in this respect.

Papers are published in medical and dental journals, lectures given at Canadian Emergency Measures College and dental faculties, technical papers prepared by Dental Health Division and published by Emergency Health Services.

There is an increasing number of pilot programs for undergraduate training in mass casualty care. For example, one dental school now provides, in addition to first-aid training, twelve specialization lectures on mass casualty care.

The importance of liaison between Emergency Health Services and dental faculties through Dental Health Division has been established for the useful realization of such projects and the co-ordination of working arrangements in this respect.

11.4.5.15

National Health Grants and Health Resources:

The Division undertakes field visits and reviews applications for national health grants in the following areas: General Public Health Grants for projects of dental pertinence and Public Health Research Grants for projects of dental pertinence, as well as dental applications for support from the Health Resources Fund.

11.4.9.16

Teaching Activities:

Professional staff of the Division lecture on request at a number of universities on subjects of their particular competence.

11.4.9.17

Sponsorship of Seminars:

The education of dental personnel in Provincial Departments of Health, Universities and in the Professional Associations as to the problems that exist in improving the standard of dental health of Canadians, stimulating them to participate actively in solving these problems, and providing them with technical advice and assistance as required has been a necessary first phase of the Division's program in recent years.

In addition to personal liaisons and specific assistance both by direct consultation and by correspondence, a major contribution to education has been the meetings of the Ministers Advisory Committee on Dental Health; its subcommittees on Dental Statistics and Evaluation; Dental Resources Development and in Dental Research. A recent and most valuable new committee is the Ad Hoc Committee on Dental auxiliaries under the Chairmanship of Chief Justice Dalton C. Wells, of the High Court of Ontario.

This Committee of multi-disciplinary membership both lay and professional is involving in an organized way a level of knowledge and talent that has never before been concentrated on the major problem of finding solutions for the dental manpower shortage. This shortage that must be solved in a practical and acceptable way before any meaningful large scale progress can be made in dental health in Canada.

11.4.9.18

Services Provided and Users:

Technical assistance and information have been provided on request to:

The Dental Directors of Provincial Departments of Health in the planning of field trials of the methodology for producing a Dental Health Index, and, in the application of a computerized methodology for recording individual dental services by age, sex, dentists, cost and time factors. This latter methodology

Special Committee

is a joint production of the Dental Health Division and the Research and Statistics Directorate, National Health and Welfare. The aim is to stimulate the active participation by universities and provincial governments in dental research by providing financial support and facilitating the use of the resources for technical assistance and advice that are available in government departments.

11.4.9.19

Users:National Health and Welfare Department

Minister's Office

Deputy Minister's Office

International Health

Child and Maternal Health

Nutrition

Information Services Division

Library

Research and Statistics Directorate

Food and Drug Directorate

Emergency Health Services

Health Education Unit

Medical Services Branch

National Defence Department

Provincial Departments of Health

Faculties of Dentistry

Conferencia Hemispherica

The Federation Dentaire Internationale

World Health Organization

and individual requests for information and advice from both professional and lay sources.

11.4.9.20

Co-ordinating MechanismsLearned and Professional Societies:

11.4.9.20.1

1. Provincial

(a) Provincial Dental Associations

(b) Consultations with provincial Dental Public Health Committees.

2. National

- (a) Canadian Dental Association
- (b) Canadian Society of Public Health Dentists

3. International

- (a) Fédération Dentaire Internationale
 - Adviser to Federation on Public Health Dental Services Commission.
 - Presentation of papers and seminars
 - paper "Dental Public Health Canada", San Francisco, 1964
 - seminar "Dental Health Education", Paris, 1967
 - Attendance at international meetings.
- (b) International College of Dentists
 - Attendance at meetings - upgrading of professional standards.
- (c) Better Dental Health for the Americas
 - Attendance at meetings - Chairman - Committee on Organization
 - San Juan, 1965
 - Washington, D.C. 1967

11.4.9.20.2

Health Organizations:

1. National

Canadian Public Health Association

2. International

World Health Organization

Universities - Faculties of Dentistry

Other Departments of Federal Government

11.4.9.20.3

Departments of Provincial Governments

Consultation with Deputy Ministers and Directors, Dental Divisions

11.4.9.20.4

Departments of Foreign Governments

- (1) United Kingdom - Ministry of Health
- (2) United States of America - Department of Health, Education and Welfare
- (3) New Zealand - Department of Health
- (4) Australia Department of Health

11.4.10 Mental Health

11.4.10.1 The Mental Health Division was established by Order-in-Council, P.C. 120-6357, dated October 3, 1945.

11.4.10.2 Purpose

The purpose of Mental Health Division is to provide consultation and assistance to the various local and provincial agencies who are providing services in the field of mental health in Canada. Among its functions are the encouragement of standards for preventive and treatment services, the planning of adequate preventive measures on a comprehensive basis, in consultation with the provinces, including mental health clinics, mental hygiene services to schools, courts, etc., the encouragement of research in the field of mental health, and serving as a clearing house of technical and professional information from Canadian and foreign sources which will be of use in medical schools, provincial governments, and other psychiatric services.

11.4.10.3 Staff

The Divisional team, directed by an experienced psychiatrist, includes consultants in psychology, social work, and nursing (mental health); a technical officer in charge of public education and office services staff.

By correspondence and personal contact, the professional staff of the Division keep abreast of mental health progress in the provincial services and the various associations in Canada in this field. The Consultants assist in the implementation of the Division's program and in the development of recommendations for utilizing the Mental Health Grant and other grants in the best interests of treatment, training and research.

11.4.10.4 Functions - General

A main aspect of the Division's work has been the provision of consultative services to the provinces, to other Divisions of the Department of National Health and Welfare, and to other Federal Government departments.

In addition, the consultants are available to provincial mental health directors for planning discussions on design of facilities, training of personnel, research programs, health education, nursing. Important contacts with mental health personnel are maintained by attendance of the Chief and Consultants at meetings of professional associations and visits to mental health facilities throughout Canada.

11.4.10.5.1 Activities

In addition to advising Health Grants Administration of all projects under the Mental Health Grant, the Chief of the Division is a member of the Department's Research Co-ordinating Committee, the Committee on Health Education of the Health Services Directorates, and the Interdepartmental Committee on Mental Retardation.

11.4.10.5.2 Research Activities

In addition to assisting the Chief of the Division in formulating policies on the most effective applications of funds for research, the Consultant in Psychology maintains liaison with various mental health agencies, universities and professional associations, especially in the field of psychology.

On the research side this entails:

- (i) securing outside appraisals of research proposals;
- (ii) evaluating the scientific worth of research;
- (iii) preparing annual reviews of current and completed research projects;
- (iv) preparing occasional appreciations of research needs; fields covered, monies expended for this purpose over the past years.

He also serves as permanent secretary to the sub-committee on mental health of the Public Health Research Advisory Committee. He is also a member of the Departmental Research Co-ordinating Committee.

11.4.10.5.3 Visits of the Consultant to provincial mental health divisions are undertaken at regular intervals, in order to evaluate existing programs and new developments, and to promote higher standards in meeting the social needs of psychiatric patients.

11.4.10.5.4 The Consultant in Psychiatric Nursing under the direction of the Chief of the Mental Health Division, develops plans and techniques

for the improvement of psychiatric nursing services in Canada; co-operates with appropriate agencies in the initiation and development of research studies on psychiatric nursing services and keeps the Department informed on developments in nursing which have relevance for psychiatric nursing services, generally.

11.4.10.5.5 Scientific and Technical Information Activities

An important function of the Division is to serve as national clearing house for technical mental health information. The bi-monthly, fifty-page journal, "CANADA'S MENTAL HEALTH", is directed primarily to professionals in the field to keep them informed on current trends and developments. It has an international circulation of about 22,000, and is an important source of information on developments in the mental health field in Canada. Besides reporting on specific projects, research experiments, innovations and trends in mental health services in hospitals, clinics, psychiatric units, schools, etc., the journal features original articles and book reviews by Canadian and international writers.

11.4.11 Nutrition Division11.4.11.1 Authority

Nutrition Services were established in 1941 in the Department of Pensions and National Health. The title of the Service was changed to Nutrition Division by Order-in-Council P.C. 121/2046 of May 22, 1946, which, in addition to section 5 of the Department of National Health and Welfare Act, provides authority for the establishment of the Division.

11.4.11.2 Objectives, Organization and Functions

The basic objectives of the Nutrition Division are to promote food consumption practices commensurate with health, fitness and well-being and to ascertain the ability of all Canadians to obtain the foods required to maintain an adequate nutritional status. The Division functions primarily on a consultant basis; as advisory to other units within the Department of National Health and Welfare, to other federal departments and agencies, to provincial governments and to national professional and commercial organizations.

The staff of the Division consists of a Chief, with medical specialization in nutrition, 3 nutrition consultants with specialized training and experience in public health nutrition and nutrition research, and supporting office staff. The program of the Division includes activities in the general areas of research, nutrition education and the practical application of knowledge in the science of nutrition.

11.4.11.3 Scientific Activities

To meet these basic objectives the Division has a number of programs.

11.4.11.3.1 The Determination of Food Consumption Patterns and Nutritional Status of the Canadian Population

The principle responsibility of the Division is to develop guidelines for the conduct of surveys of dietary intake and nutritional status and to select a method or methods which

can be used most efficiently either for large scale studies in breadth or for limited studies in depth. These studies may be carried out by the federal department, by provincial departments, or by other agencies financed by Public Health Research Grants but coordinated by the Nutrition Division. The surveys aid in the identification of groups at risk because of poor nutrition and also may indicate the necessary means of correction.

11.4.11.3.2 Investigation of Nutrition Education Methods and Assessment of Their Application to Various Population Groups

The Division sees the need to improve the efficiency of nutrition education programs in order to ensure better health for Canadians. This can't be done without first studying the reasons for human behaviour towards foods and requires collaboration with social scientists, education specialists and of other disciplines. Coordination of these studies and stimulation of studies in the areas requiring the greatest amount of research should result in more effective use of personnel and education materials.

11.4.11.3.3 The Development of Models of Recommended Function and Organizational Settings for Nutrition Services Within Health Departments

The changing pattern of public health emphasis within the community requires continual assessment. The needs of the community for special nutrition services are also changing and consequently research into the needs and the best means of satisfying them is of prime importance. Operational research is needed before the most effective and most economical models for the organization for nutrition services within the whole public health structure can be developed. Results of these studies would help academic institutions design more effective programs to meet future needs; establish desirable administrative relationships between federal and provincial nutrition divisions; help federal and provincial nutrition divisions to present the best possible estimates for staffing requirements.

11.4.11.4. Scientific and Technical Information Activities

The Division maintains a National Repository of Nutrition Research, which provides a central reference service on reported nutrition research as well as that in progress.

This information is available on request.

The average nutrient intake of Canadians is calculated from DBS data on the per capita domestic disappearance of food.

This information is published annually.

11.4.11.5 Scientific Manpower Training

There is no formal program but lectures to university students are given across Canada. Field observation is provided to graduate students in nutrition and to student interns, as well as to foreign students in cooperation with External Aid. National nutrition education conferences are held every five years and assistance in planning symposia on various aspects of nutrition is given to various scientific and professional groups.

11.4.11.6 Standardization

The Dietary Standard for Canada (recommended nutrient intakes for Canadians) was first published in 1950 and revised completely in 1963. The Division, in conjunction with the Canadian Council on Nutrition, ensures the updating of these standards to conform with current scientific knowledge. Revisions are made in consultation with specialists in various fields of nutrition with consideration given to international recommendations.

11.4.11.7 Coordinating Mechanisms

The Canadian Council on Nutrition, an advisory committee to the Minister of National Health and Welfare, acts as a coordinating body between the Nutrition Division and the Canadian Medical Association, Canadian Dietetic Association, Canadian Home Economics Association, Canadian Nurses' Association, Canadian Teachers' Federation and University Departments of Home Economics, Nutrition and Physiology.

Special Committee

The Dominion-Provincial Nutrition Committee is made up of senior nutritionists from each provincial health department and acts as a coordinator between federal and provincial programs in research, education and nutrition service.

Liaison membership on the Food and Nutrition Board (NRC/NAS) Washington and the Food and Agricultural Organization in Rome, assists in international coordination of information.

11.4.12 Laboratory of Hygiene11.4.12.1 Authority for the establishment and maintenance of the Laboratory of Hygiene.

The Laboratory of Hygiene may be considered as the public health reference laboratory of the Government of Canada.

The establishment and maintenance of this national laboratory for public health and research was authorized by Bill 37, passed in the House of Commons April 11, 1919.

Under the authority of the Act establishing the Department of National Health and Welfare, dated 24th July, 1944, the functions and responsibilities of the Laboratory of Hygiene were further defined as follows:

- a) To serve as the National Public Health Reference Laboratory;
- b) To establish services and conduct research in public health laboratory and clinical laboratory fields;
- c) To conduct and promote investigations and research into Canada's health problems.

Under the authority of the Food and Drugs Act RS 1953, the Laboratory of Hygiene is empowered:

- a) To inspect and control manufacturers of biological products such as sera, vaccines, toxoids and antibiotics,
- b) To control quality and establish standards for the products noted above;
- c) To conduct associated research and investigations.

11.4.12.2 Objectives and Goals

The two prime objectives of the Laboratory of Hygiene are to provide special technical assistance and expert advice

- (1) to the provincial departments of Health and to hospitals in an effort to improve health laboratory services in Canada
- (2) to the Food and Drug Directorate in the control of those special drugs commonly known as "Biologics".

Within these overall objectives the Laboratory has established the following goals:

1. To provide administrative services to the expert laboratories established to meet the above objectives.
2. To provide a National bacteriological reference centre.
3. To control the biological drugs other than viral.
4. To improve laboratory services for syphilis serological diagnosis and for clinical chemical diagnosis.
5. To control viral vaccines and therapeutic sera.
6. To provide a national virological reference laboratory service.
7. To investigate the distribution and importance of the zoonoses.
8. To provide a national parasitology reference laboratory service by contracting with the Institute of Parasitology for this service.

11.4.12.3 Organization and activities.

The Laboratory of Hygiene is essentially a scientific organization. It is divided functionally into five scientific sections and an administration section while special parasitology services are contracted for with the Institute of Parasitology, McGill University. Its activities are essentially scientific.

11.4.12.3.1 Bacteriological Laboratories

This section provides highly technical and advisory services to the Provincial laboratories and to other government agencies, collaborates with a number of national and international reference laboratories, carries out applied research particularly in methodology and assists in the training of Provincial and other approved laboratory personnel in highly specialized techniques.

The main activities of the Bacteriological Laboratories are:

- 1) The provision of a National Reference and Typing Centre service for the Enteric Bacteria -- Salmonella, Shigella and pathogenic Escherichia coli -- to the provincial departments of health and DVA hospital laboratories.

This involves not only the identification of cultures referred to the Centre, but the preparation and distribution of diagnostic reagents for these groups of bacteria to the above-mentioned agencies.

- 2) The provision of a National Reference Laboratory Service for the pathogenic Staphylococci and haemolytic Streptococci to the provinces. As above, this involves the diagnosis of referred specimens and the preparation and distribution of diagnostic reagents.
- 3) Research to develop new (improved) methods of diagnosis.
- 4) Studies on the control of bacteria in hospital environments to reduce hospital acquired infections.

11.4.12.3.2 Biologics Control Laboratories.

The Biologics Control Laboratories, as the name implies are concerned with the class of drugs known commonly as "Biologics" (vaccines, toxoids, sera, antibiotics and the like), primarily with their control but also with their use in promoting better protection against infectious disease. This Laboratory provides the technical services and expert advice to the Director General of the Food and Drug Directorate essential for the control of the drugs, and collaborates with the provincial departments of health and other agencies in the promotion of better immunization agents and programs. The activities of these laboratories may be broadly divided into (a) control and (b) research.

- (a) Control. The emphasis here is on the actual assay of "biologicals" for sale on the Canadian market and for the control of their manufacture, such as vaccines, toxoids, antibiotics and others, through regular inspection of all licensed establishments.
- (b) Research. Research in these laboratories is directed primarily towards improved methods of control and then towards the development of better vaccines.

These laboratories continue to be represented on a number of WHO panels (Biological Standardization, Bacterial Diseases, Tuberculosis, Venereal Diseases and Immunology), and collaboration with this organization has been particularly active in their meningococcal vaccine trials in Africa.

11.1.12.3.3 Clinical Laboratories

The activities of these laboratories have been directed towards the control of quality of work in public health and hospital laboratories, especially in the fields of clinical chemistry, syphilis serology and blood group serology. Clinical Chemistry - In order to assist hospital and public health laboratories in improving quality of work performed, the Laboratory many years ago prepared a Manual of Clinical Chemistry, which in loose-leaf form can be modified or added to as more work is done. It also prepares and distributes a reference standard for hemaglobin determination and evaluates various commercial kits, reagents and devices for chemical determinations on the market.

The Clinical Nutrition Laboratory participates in nutrition and health surveys and provides laboratory services to public health laboratories, hospital laboratories and physicians. Syphilis Serology - This laboratory serves as a National Reference Centre for syphilis serology. As such, it distributes carefully standardized reagents to provincial laboratories, conducts national evaluation of performance studies at regular intervals, presents refresher training courses from time to time and evaluates new tests. It also operates and maintains a Treponema Pallidum Immobilization (TPI) unit for syphilis diagnosis for specimens referred to it by provincial departments of health.

11.1.12.3.4 Virus Laboratories

The Virus Laboratories have the responsibility for testing viral products such as poliomyelitis, influenza, adeno and

small pox vaccines in accordance with the Canadian Food and Drugs Act; they render diagnostic services to provincial and other federal government departments, prepare and distribute standardized diagnostic antigens and antisera, conduct research, and act as the Influenza Information and Strain Typing centre for W.H.O. These Laboratories also serve Canada as the National Virus Diagnostic Reference Centre.

11.4.12.3.5

Zoonoses Laboratories

The principal function of the Zoonoses Laboratories is to study the distribution and assess the importance of exotic diseases transmissible from animals to man, such as Rocky Mountain spotted fever (RMSF), Q Fever, California encephalitis and leptospirosis. These Laboratories conduct surveys to determine the occurrence and assess the importance of these diseases in Canada and provide assistance and advice to provincial departmental authorities. As the National Zoonoses Centre for Canada, they collaborate with the federal Department of Agriculture, provincial Public Health Laboratories, and the Epidemiology Division in collecting and disseminating information on the incidence of zoonoses in Canada. There is active collaboration with the Department of Indian Affairs in attempts to control ticks on Indian Reservations. These ticks have been found to harbour the causative agent of tularemia.

11.4.12.3.6

Parasitological Laboratories

The Institute of Parasitology, Macdonald College, Quebec, serves as the Parasitology Section of the Laboratory of Hygiene and provides consultant and technical services to the provincial departments of Health. Among others the Laboratories conduct research on skin test antigen used for the diagnosis of Hydatid diseases. It gives courses in practical parasitology, which are attended by personnel of Provincial Laboratories.

11.4.12.3.7

National Tuberculosis Reference Laboratory

The most recent addition to the services provided by the Laboratory of Hygiene is the National Tuberculosis Reference Laboratory. This laboratory is expected to fill the need for a central expert reference laboratory for the referral of specimens from the Provinces for strain identification and for their susceptibility to antituberculosis drugs.

11.4.12.3.8

Coordination of activities

Coordination of Provincial and Federal public health laboratory services is maintained through the Technical Advisory Committee on Public Health Laboratory Services which includes amongst its membership the directors of the provincial public health laboratories and the director of the Laboratory of Hygiene. This Committee reports to the Dominion Council of Health whose main function is the provision of the means of co-ordination with respect to provincial health programs and between federal and provincial health authorities.

11.4.13 Occupational Health

11.4.13.1 Authority and Prime Objectives

The Division now known as the Occupational Health Division was established in 1938 as the Division of Industrial Hygiene, under the authority of Order-in-Council P.C. 26/1939 of August 12, 1937.

The title of the Division was changed by Treasury Board Minute, T. B. 447991 of May 28, 1953, to the Occupational Health Division as an indication that its activities concerned all aspects of the health of workers.

The Occupational Health Division is concerned with service, research, and teaching in all matters affecting the protection and improvement of the health of workers and the effects of air pollution on the health of all Canadians. The Division's activities include environmental and clinical surveys; physical, chemical, and biological laboratory services; consultative services in the field of medical, nursing, engineering and other sciences; publication of educational material; and the promotion of teaching and research in occupational health and air pollution in Canada. The main programme areas are the following:

11.4.13.2 Occupational Health Consultant Programme

In addition to the conduct of special studies and research, the consultant programme includes the activities of medical and consultant services.

11.4.13.2.1 Clinical Consultants

The Objectives of the clinical consultant programme involve:

- (1) participation in all environmental assessment (health) studies
- (2) providing medical interpretation of:
 - (i) the results of studies of toxic agents investigated in the laboratory, and
 - (ii) the effects of occupational hazards on the health of exposed individuals in the community. Such hazards

come from: the handling of chemicals, the presence of dusts and vapours, excessive noise, and faulty illumination, heating ventilation, etc.

An extensive advisory service, in regard to the design and conduct of surveys as well as other occupational health scientific programmes, is provided to the provincial departments and other organized health agencies.

Teaching at universities, as well as the promotion and co-ordination of occupational health programmes in various parts of the country, are essential features of the medical consultant service.

11.4.13.2.2 Aerospace Medicine

The objective of the aerospace medical consultant programme is mainly to provide a consultant and advisory service to the Department of Transport, other government departments, and interested agencies, on medical problems related to the health, comfort and safety of the air traveller.

While research is not a major feature of this programme, nevertheless, aeromedical studies have been initiated and advice given in respect of, e.g., aircraft accident investigation, aviation environment and human factors.

11.4.13.2.3 Nursing Consultant

The purpose of this programme is to advance the use of the principles of public health, by occupational groups in Canada, through an extensive consultant advisory service to:

nurses in industry,

provincial health departments,

federal government departments and hospitals,

local health agencies and other interested groups and persons.

Activity is also centered in university and institutional teaching programmes.

Evaluations and other studies are also conducted to develop and improve standards for nursing services in the field of occupational health.

11.4.13.3 Environmental Toxicology Programme

The general objective of this programme is to assess the biological effects, the mode of action and biotransformation of toxic chemicals, such as solvents and carcinogenic substances, which comprise health hazards to workers in certain industries. The studies are centred about development and use of improved laboratory methods required to evaluate the toxicity and safety of many chemicals including carcinogenic materials. From these enquiries: compounds have been suggested to replace certain toxic materials widely used in industry, and experimental threshold limit values determined as useful measures of toxicity for purposes of effective control.

11.4.13.4 Programme on Pesticides

The overall objective of this programme is to study the mode of action and toxic effects of a variety of pesticides on industrial and agricultural workers, and the general public. Emphasis is put on: investigations of the effects of pesticides on enzyme systems produced in response to toxic materials, as well as the development and interpretation of tests for clinical use. The information derived from such studies is useful in controlling toxic reactions in humans associated with the manufacture, handling, storage and disposal of pesticides.

11.4.13.5 Air Pollution Health Effects Programme

The air pollution programme of the Biomedical Unit has the overall objective of evaluating the possible harmful effects of air pollutants to health. Stress is put on epidemiologic and clinical studies in efforts to ascertain possible deleterious effects of air pollutants on health and especially their role in the aetiology of respiratory conditions, such as lung cancer, chronic bronchitis and emphysema.

Data from such assessments are important in establishing criteria to be used as reference bases for purposes of air quality control.

11.4.13.6 Experimental Pathology Programme

This programme has the objectives of developing and improving laboratory diagnoses of conditions possibly due to dusts and other noxious agents.

Importance is given to investigations pertinent to cancer-producing properties of pollutants and their effects on organ systems.

It is thought that studies on the pathology of specimens obtained from persons post mortem and in vivo exposed to industrial and other hazards are valuable in providing basic information necessary for control purposes.

11.4.13.7 Industrial Hygiene Programme

The main function of the Industrial Hygiene Programme is to provide consultative services and technical assistance to provinces, industries and universities for the evaluation of industrial environments and in the implementation of the Canada Labour Safety Code.

11.4.13.8 National Air Pollution Programme

This programme is concerned with the measurement and assessment of the potential hazards of air pollutants. Special attention is being given to the development of a uniform national sampling programme. Special investigations are carried out to meet the requirements of the International Joint Commission with regard to international air pollution problems. Research is conducted with the objective of developing standards of air quality and air quality criteria and the improvement of methods for air pollution control.

11.4.13.9 Implications

Realization of the objectives of the programmes preceding has important implications for:

(a) Establishing valid indices and reference bases as:

- (i) measures of performance of health practices in the occupational health field, and

- (ii) standards for controlling and preventing hazards related to working environments.
- (b) Developing improved methods:
 - (i) to diagnose conditions associated with occupational health hazards of many kinds, and
 - (ii) to reveal sources and concomitant levels of occupational hazards.
- (c) Pointing up deficiencies in occupational health programmes so that remedial action might be taken for the preservation and improvement in the health of industrial and other groups in the country.
- (d) Reduction in absenteeism, morbidity and mortality due to occupational risks and the deleterious effects of environmental pollutants of various kinds; the ultimate objective being the improvement of health of the Canadian people and a concurrent reduction in the enormous burden of chronic ill health on the economy of the country.

11.4.13.10 Publications and Technical Information Service

The Division publishes two periodicals: The Occupational Health Review, containing articles of interest to technical and professional personnel and The Occupational Health Bulletin, dealing with subjects of interest to lay and professional groups. Scientific publications of members of the Division cover a wide range of laboratory and occupational health subjects. A list of these publications is available upon request.

11.4.13.11 Coordination, Consultant Participation to Various Committee Activities

Coordination of activities and transfer of scientific and technical information are achieved through consultant participation in activities of various committees which include:

- Air Pollution Health Effects Committee of the Advisory Board of the International Joint Commission
- International Labour Organization
- World Health Organization
- Interdepartmental Committee on Forest Spraying

Special Committee

- Defence Research Board Committee on Pesticides
- Steering Committee for the National Study of the Biological Effects of Asbestos
- Federal Interdepartmental Committee on Pesticides
- The International Union of Pure and Applied Chemistry
- Committee of Organization for Economic Co-operation and Development
- Permanent Commission and International Association on Occupational Health
- National Committee on Pesticide Use in Agriculture
- N.R.C. Associate Committee on Agricultural and Forestry Aviation

11.4.14 Radiation Protection Division

11.4.14.1 Authority

General authority for the activities of the Division is provided in Section 5 of the Department of National Health and Welfare Act. Specific authority also is contained under the Atomic Energy Control Regulations to provide advice and recommendations concerning health safety for radio isotope users and operators of nuclear reactors and particle accelerators.

11.4.14.2 Purpose

The Radiation Protection Division is concerned with:

- (a) the health radiation of workers in industrial research medical establishments; and
- (b) assessment and recommendations concerning the exposure of the general population from all sources of the ionizing radiation including fallout from nuclear tests.

11.4.14.3 Radiation Protection Standards

The Division uses, wherever practical, the recommendations of the International Commission on Radiological Protection as a basis for health assessment of radiation exposure data. These recommendations have some, but limited, applicability, when considering the radiation exposure to members of the public.

11.4.14.4 Organization, Responsibilities and Activities

The Division is divided into three organizational services; Medical and Biological, Scientific and Technical, and Administrative. In all, about 91 persons - doctors, scientists, technicians and clerks are engaged in the division's operation. The work of the division has been assigned to the following sections:

11.4.14.4.1 Safety Assessment and Control Section

This section advises the Atomic Energy Control Board on the health and safety aspects of the use of radioisotopes. As a normal procedure before granting a Radioisotope Licence, the AECB refers applications to the section for health approval. A review of the

applicant's proposal, facilities and staff is conducted, and appropriate conditions and restrictions imposed.

The section carries out surveillance of radioisotope uses, through technical inspectors, to ensure compliance with the Atomic Energy Control Regulations.

The section operates a Personnel Dosimetry unit which provides radiation detectors for use of workers subject to exposure. Approximately 25,000 workers wear the devices (film badges) which are processed at 2-week intervals to determine exposure doses. A cumulative record of lifetime exposures is maintained. Special, more complicated detectors are supplied to workers dealing with neutron sources and fissionable material.

The section investigates the health hazards of x-ray machines. It is preparing safety guides for operating procedures and establishing standards for the equipment marketed. The radiation dose received by operators in various diagnostic procedures and the unwanted (leakage) radiation received by patients is being assessed in statistical studies.

11.4.14.4.2

Nuclear Medicine Section

The work of this section is closely related to that of the Safety Assessment and Control Section. It is concerned with the use of radioisotopes in medicine. In this case, working through the Department's Advisory Committee on Clinical Uses of Radioisotopes, attention is directed to the patient. Radiation sources in the form of radioactive pharmaceuticals, radiation applicators and teletherapy machines are being increasingly used in diagnosis, investigation and treatment of diseases. It is the purpose of this Section to review radioisotope licence applications for such uses to ensure that the use is justified and that the patient dose is within acceptable limits.

The section is also responsible for assessing the medical problems involved in following up cases of overexposure to radiation, as brought to light by personnel dosimetry and other methods, and providing consultative medical advice to federal and provincial agencies in such matters.

11.4.14.4.3 Radiochemistry and Physics Section

These sections carry out most of the work relating to environmental contamination. The greater part of their efforts in the past have been directed toward a comprehensive study of radioactive fallout from nuclear weapons tests - through the systematic collection and analysis of air precipitation, soil, food, and human tissue samples. However, monitoring of reactor environments and selected areas of suspected higher than normal natural radioactivity are becoming more and more important. In addition, both sections carry out developmental work in measurement techniques and specialized laboratory studies related to regulatory responsibilities. Among the special facilities employed is a whole body counter which is capable of measuring minute amounts of radioactivity in the living human body.

11.4.14.4.4 Biology Section

The work of this section includes the biomedical assessment of individuals or groups subject to environmental or occupational radiation exposure either internally or externally. In particular, it provides biomedical assessment of individuals who have been accidentally overexposed. There is also a research capability directed to the investigation of the metabolic behaviour in man of selected radioisotopes of health interest, and also to the basic study and application of potential biological indicators of radiation exposure (biological dosimetry) and their relationship to somatic and genetic consequences of radiation exposure. Currently, research is centered on an intensive study of the microscopic defects produced in the chromosome structures of the human cell by exposure to radiation. Such characteristic defect patterns are a most sensitive index of radiation exposure and, equally important, expose the mechanism by which radiation may produce delayed carcinogenic effects in the individual and congenital defects in his progeny.

11.4.14.5 Scientific and Technical Information

Members of the Division are also concerned with regular provision of scientific and technical information which includes the following:

Special Committee

Monthly Report - provision of a monthly report "Data from Radiation Protection Programs" containing data from the fall-out studies, reactor environment monitoring and safety assessment and control operations;

Lectures presentation of lectures on radiation protection at various society and other meetings;

Scientific Reports preparation of reports on divisional work either for publication in the scientific literature or as departmental reports;

Safety Codes preparation of safety codes giving in detail the requirements for safe handling of radioisotopes used in specific applications;

Training Courses provision of short-term training courses in radiation protection for radiation workers;

Information Bulletins preparation of information bulletins describing in lay language various aspects of the Division's work and responsibilities.

11.4.14.6

Coordinating Mechanisms

The coordination of activities is ensured through the work of several advisory or technical committees, such as

11.4.14.6.1

Advisory Committee on Radiation Protection

An Advisory Committee on Radiation Protection, composed of recognized authorities from universities and other non-governmental sources as well as government scientists, was formed in 1964 to provide the Minister of National Health and Welfare with assistance and advice in the continuing development of a comprehensive national radiation protection program and to study and make recommendations concerning radiation protection standards for Canada.

11.4.14.6.2

Committees

Members of the Division are called upon from time to time to serve on various governmental, national and international committees. For example, the Division is represented on two Atomic Energy Control Board Committees - The Reactor Safety Advisory Committee and the Ad Hoc Committee on the Safety of Particle Accelerators. A member

of the Division serves on the Department of Transport's Technical Committee on Uniform Regulations for Transportation of Radioactive Materials, and the Division is represented on several committees of the Canadian Standards Association and on the Committee on Standards, Units and Protection of the Canadian Association of Radiologists. Members of the Division maintain liaison with the International Commission on Radiological Protection and provide advice on working groups of the United Nations Scientific Committee on the Effects of Atomic Radiations, the World Health Organization and the International Atomic Energy Agency. Members of the Division are also active on Departmental committees such as the Advisory Committee on the Clinical Uses of Isotopes and the Advisory Committee on the Development of Uniform x-ray Safety Standards.

11.4.15 Public Health Engineering11.4.15.1 Objective and responsibilities

The primary objective of the Division is the promotion and preservation of the health of the people of Canada by using engineering principles and scientific knowledge to solve environmental health problems.

The responsibilities of the Division to accomplish this objective are contained in the Department of National Health and Welfare Act; a Bilateral Memorandum of Agreement on Shellfish, and a Cabinet directive on a federal water pollution control and abatement program for federal facilities.

11.4.15.2 Organization

The activities of the Division are essentially scientific. Several of the disciplines are related to the chemistry and physical aspects of water. Basically they fall within four broad programs - Advisory and Consulting services; International Joint Commission Water Pollution Investigations; Water Pollution Control and Abatement, Federal Facilities; and Research and Development. Headquarters and research facilities of the Division are located in the Environmental Health Centre, Tunney's Pasture, Ottawa, with Regional Offices at Moncton, Montreal, Winnipeg, Edmonton and Vancouver. I. J. C. Water pollution investigations on the Great Lakes are conducted from laboratories developed for this purpose, at Kingston, Ontario.

The Division has an establishment of 100 positions this past year. Of these, 55 were classified as professional, 27 as technical and 18 in the administration support category.

11.4.15.3 Program Activities11.4.15.3.1 Advisory and Consulting Services

The Division carries out investigations and bacteriological surveys relating to: water supply and treatment; waste treatment and sanitation problems; the Shellfish Control program which it administers; and the Atlantic Development Board Industrial Waste Abatement Program.

It provides consulting services on water and sanitation problems for the Federal Government departments and agencies and for Provincial Governments.

11.4.15.3.2

International Joint Commission

In co-operation with the International Joint Commission, it investigates and makes recommendations concerning water pollution in international boundary waters; i.e., References for Lake Erie, Lake Ontario, the St. Lawrence River and Connecting Channels, the Red River, the Rainy River and the St. Croix River; and provides representation on advisory boards for all references.

11.4.15.3.3

Research and Development

Members of the Division associated with this portion of the program are contributing to the advancement of knowledge in their particular field of interest. Contributions are in the form of scientific papers based on original research presented at technical meetings and published in leading scientific journals, as well as participation in steering and advisory committees.

Projects initiated during the past year and currently under study by the Research Group include the following studies:

- a. Ozonation of Phenolic Wastes;
- b. Chemical transformations in Aerobic Bio-Oxidation Units;
- c. Survival and Growth of Bacteria in Simulated Sea Water;
- d. Phosphate Removal by Ion Exchange;
- e. Potato Waste Pilot Plant Studies.

In addition to the foregoing research activities, a number of independent methodological research investigations were conducted by the Bacteriological Laboratories in Ottawa and Kingston.

These included:

- a. A study of survival and multiplication of enteric index bacteria and pathogens in river water.
- b. A comparative study of standard and tentative methods for the enumeration of bacterial pollution indices in river water, well water and sewage.

- c. A study of techniques for the isolation of Salmonella from large grab samples of water and sewage.
- d. An extensive, comparative study of three commercially-available membrane filters, and three Endo media for use with the membrane filtration technique was completed in 1967.

11.4.15.3.4

Water Pollution Control and Abatement for Federal Facilities

The Division conducts investigations to evaluate the performance of existing waste water disposal systems and recommends the action which must be taken to provide the degree of treatment required to meet the Division's objectives; it approves plans for new systems and modifications to existing plants.

11.4.15.3.5

Staff Development Programs - General Statement of Policy

The Division recognizes that persons engaged in the field of water quality improvement and control must be familiar with many of the classic disciplines, and that it is difficult and time-consuming to keep abreast of recent developments in any of them. Thus, the policy is to support training and refresher training for those members of the staff who are likely to benefit from it. Each year the Division allocates funds for training courses for professional and technical staff in the amount of \$10,000. for short courses at technical institutes; and \$22,000 (1968-69) for formal university training courses.

During the current year the Division is sponsoring three Ph.D candidates. Two of these are at Canadian Universities while one is in the United States. In previous years on occasion one or more candidates are sponsored at the Master's Degree level. Many other technical staff members take various short courses. Some of the courses are offered through the United States Department of the Interior and are given at various centres in the United States. Others are offered as part of university summer programs or as part of extension programs.

11.4.15.3.6

Criteria for Measurement of Achievement - Assessment of Benefits

- a) The extent to which data and recommendations provided through investigations undertaken by the Division is

utilized by federal, provincial and other agencies in establishing waste abatement programs.

- b) The extent to which the waste treatment processes developed are accepted by the scientific community and are adopted by governments and, where applicable, by industry.
- c) The frequency with which other departments request and implement recommendations relative to the advisory services program.
- d) The demand for professional staff to publish papers in journals and present research findings to technical meetings and seminars.

Assessment of Benefits

Cost benefit analyses of public health programs are difficult to establish on a meaningful basis, since valid judgments cannot always be made with respect to some of the factors involved. Benefits derived from the Division's programs can only be assessed over an extended period of time and, in general terms, in relation to the effectiveness of measures adopted to restore water quality, to improve sanitation and adverse environmental conditions associated with housing and urban renewal.

11.4.15.3.7

Co-ordinating mechanisms, Boards and Committees

Members of the Division were active on a number of committees and boards formed to study problems related to public health engineering, especially water pollution. This promotes co-ordination and from such participation all programs of the Division benefit from an exchange of information.

On October 31 and November 1, 1967, the Advisory Committee on Public Health Engineering held its second meeting since formation of the Committee in 1966. The committee is composed of provincial public health agencies and engineering representatives from other interested organizations. Through this Committee, problems are discussed and advice is provided to the Minister through the Dominion Council of Health. At the second meeting major discussions dealt with the development of Canadian Drinking Water Standards and the problem of solid waste disposal in Canada.

Two members of the Research Group of the Division are members of the Canadian Committee of the International Association on Water Pollution Research. The purpose of this committee is to keep the members abreast of water research activities in Canada as well as stimulate water pollution research at the international level.

The Division is also represented on other boards and committees, such as:

1. Interdepartmental Shellfish Committee
2. Advisory Committee to the Atlantic Development Board on Industrial Pollution Control of the Watershed in the Atlantic Provinces.
3. Supervisory committee on the Atlantic Provinces Water Resources Study for the Atlantic Development Board.
4. The I.J.C. Water Pollution Boards - Great Lakes Connecting Channels, Rainy River, Red River and the St. Croix River.
5. National Research Council associate committee on Water Pollution Research.
6. Ad Hoc Safety Committee for the Eldorado Uranium Hexa fluoride plant at Port Hope.

11.4.16 Rehabilitation Services11.4.16.1 Authority

Statutory authority for the establishment of the service is provided by Section 4 (2) and Section 5 (a)(1) of the Department of National Health and Welfare Act.

The Blindness Control Section continues to carry out the functions of the Blindness Control Division which was established within the Department of National Health and Welfare under the authority of Order-in-Council P.Q. 186-7500 of December 29, 1945.

11.4.16.2 Organizational Development

Previously designated as the Medical Rehabilitation Division, Rehabilitation Services has developed as a consequence of growth and expansion and now consists of a central administrative and support corps under the director, and four distinct sub-activities, which have in common their medical orientation on behalf of disabled persons in Canada. The four areas of endeavour which now comprise the Directorate of Rehabilitation Services are Medical Rehabilitation Consultation, Disability Assessment, Prosthetic Services and Blindness Prevention.

11.4.16.3 Scientific Activities of Rehabilitation Services by Sections11.4.16.3.1 Medical Rehabilitation Consultation

This section provides a national consulting and co-ordinating service in the field of medical rehabilitation.

Activities:

- (a) Advice is provided on the medical, social and technical aspects of medical rehabilitation programs to hospitals, rehabilitation centres, specialized clinics, universities, voluntary organizations and public health and welfare departments at the various levels of government - local, provincial and federal.
- (b) Health Grants - The work also includes the technical appraisal of projects under the grants program, especially the Medical Rehabilitation and Crippled Children's Grant. Advice is provided on the establishment and/or operation of facilities for the treatment and rehabilitation of disabled persons of all ages; on projects related to the training of medical and paramedical

members of the rehabilitation task; and finally, on research projects in the field of medical rehabilitation.

Prosthetic Research and Training - The Expert Committee on the Rehabilitation of Congenital Anomalies Associated with Thalidomide, recommended the establishment and development of centres for training and research in the prosthetic problems presented by deformities of this type. Two hundred thousand dollars was added to the Medical Rehabilitation and Crippled Children's Grant in 1964-65, specifically to provide funds for the development and continuing support of regional centres for research in new methods in prosthetic and orthotics and for the training of personnel in these fields.

In 1965-66, this amount was transferred to the Public Health Research Grant. Three centres have been established and are now in operation in Montreal, Toronto and Winnipeg.

- (c) Scientific and Technical Information Activities - Field visits to the various provinces are made to study current developments in medical rehabilitation. Statistical and other reference material on rehabilitation facilities and on medical and technical training are kept for information purposes and presentation to organizations, committees and conferences. Consultant services are also provided for the production of informational material, educational pamphlets, radio scripts and films, in the field of medical rehabilitation.

11.4.16.3.2 Blindness Prevention

This section is responsible for the determination of medical entitlement to Blindness Allowances, under the Blind Persons Act and regulations. In collaboration with the provincial authorities, it supervises and administers a treatment plan for the restoration of vision for recipients of Blindness Allowance. It also provides a national consulting and co-ordinating service in the field of blindness prevention.

Activities - Consulting and co-ordinating service in the field of blindness prevention.

- (a) Liaison is maintained with hospitals, specialized clinics, universities, professional bodies and voluntary organizations in the ophthalmological field. A consultant function is carried out in blindness prevention aimed at stimulating, encouraging and assisting provincial health departments in planning and developing balanced programs.
- (b) Advice and technical appraisal is provided on projects under the health grants program which concern the preservation of vision. The projects relate to services such as glaucoma, orthoptics, and other special eye clinics; to training in ophthalmology and related fields; and to research directed at some of the main causes of blindness.
- (c) Scientific and technical information activities.
This section is also responsible for the collation and dissemination of technical information, data and statistics of professional interest. Information is being taken from clinical reports to provide up-to-date statistics on the causes of blindness among recipients of Blind Persons Allowances. Public educational programs in co-operation with provincial authorities are also carried out by way of pamphlets, radio-scripts and films.

11.4.16.3.3 Disability Assessment

(a) Disabled Persons Allowances

A consultant function is maintained with respect to the evaluation of disability in the determination of medical entitlement to Disabled Persons Allowances. Emphasis continues to be directed to the development of uniform interpretation of the medical standards employed in the evaluation of disability.

(b) Canada Pension Plan

An advisory function is provided to the Canada Pension Plan Administration for the development of the medical aspects of the Plan, with reference to disability pensions and disability-related benefits to survivors. These medical aspects include the

appropriate medical standards and procedures for use in the determination of disability and in the rehabilitation of disabled contributors.

11.4.16.3.4 Prosthetic Services

Transfer - Under P.C. 1965-218 of February 9, 1965, transfer of the control and supervision of the Prosthetic Services from the Department of Veterans Affairs to the Department of National Health and Welfare was authorized. This sub-activity is responsible for the management of the Prosthetic Services Organization consisting of a central manufacturing establishment at Sunnybrook Hospital in Toronto, and twelve prosthetic centres across Canada. In addition to production and fitting operations, it conducts evaluative and developmental research on prostheses, an increasingly complex and rapidly changing field.

11.4.17 Emergency Health Services.

11.4.17.1 Authority and responsibilities.

The role of the EHS Division of the Department of National Health and Welfare is, briefly:

- a) To ensure that the Health Branch of the Department of National Health and Welfare is itself able to continue operating in time of war, and
- b) To assist and advise provinces and municipalities in emergency health planning.

The detailed responsibilities of the Division are laid out in the Civil Emergency Measures Planning Order, P.C. 1041 of the 1965.

11.4.17.2 Organization

The Division is headed by a Chief, who has a number of full-time consultants. The organization, currently of some 65 people, is shown on the attached table.

11.4.17.3 Responsibilities of consultants and their sections

11.4.17.3.1 Medical and Hospital Services Section

This section is primarily responsible for planning for the provision of casualty care and continuing medical care. To this end, the emphasis has been on hospital disaster planning, municipal and provincial planning for disaster, and the concomitant education needed in these fields. The development of professional aspects of the doctrine for the employment of emergency medical units is also a responsibility of this section.

11.4.17.3.2 Special Projects Section

This section, headed by the Senior Consultant, provides advice on the medical aspects of nuclear, biological and chemical warfare to all departments of the government, apart from the Department of National Defence. This principal programme has been one of education for all segments of the population.

11.4.17.3.3 Nursing Services Section

The Nursing Services Section is responsible for educational and informational programmes in the field of nursing and home nursing. The Nurse Consultant co-operates actively with the nursing professional bodies across Canada and her work is closely linked with that of the Medical and Hospital Services Section.

11.4.17.3.4 Public Health Section

It was evident in the early planning that public health measures would be of at least equal concern with casualty care measures. The study of problems arising in the post-attack period and later problems of recovery and rehabilitation are the function of this section.

11.4.17.3.5 Health Supplies Section

The primary function of this section is to provide health supplies for use in both the casualty care and public health programmes. This entails the procurement, packaging, warehousing and distribution of the national health supplies stockpile.

11.4.17.3.6 Operational Planning Section

This section is engaged in developing techniques and operating procedures for the health elements of emergency government headquarters, and for target analysis and casualty estimation. It is also analyzing the vulnerability of health installations across the country to the direct effects of attack and to fallout. During 1967-68 officers of the Division conducted or assisted in studies under the following topics:

1. The Dimensions of Contamination
2. Planning for Radiologically-safe Drinking Water in
Fallout Conditions
3. The Clinical Aspects of Biological Warfare
4. The Evaluation of EHS Programs for SIMPAC study (a
combined Treasury Board/Canada EMO Management Project)

Where possible, assistance was given to provinces to extend re-entry planning and Casualty Care planning to provide mutual support with adjacent regions in the United States.

11.4.17.3.7 Resources Analysis Section

Data, on which estimates of resources remaining following an attack will be based, are gathered by this section. Surveys of all health resources (manpower, material and facilities) will also be required to prepare plans for renewed production of essential items during the recovery phase.

Surveys of Canadian schools of dentistry, medicine, pharmacy, veterinary medicine and nursing have been conducted. A survey of wholesale pharmaceuticals was completed and all resource maps, for those resources which have been surveyed, were brought up to date. Basic data and format for surveys on pharmaceutical manufacturing and the surgical dressing industry were prepared. Data were compiled on specific products for study in NATO exercise CIVLOG 69. These will be combined with data provided by other departments and ultimately with that from other countries to provide an opportunity to study the entire NATO logistic system.

11.4.17.3.8 Operations, Training and Administration Section

This section is responsible for the Continuity of Government Programme described earlier, for the co-ordination of all EHS training courses, and the preparation and publication of educational material and training aids and for the general internal management of the Division.

A major portion of the total EHS effort is devoted to this program. It involves continued participation in federal committees, Defence Research Board Panels, programs of national health associations and assistance to provincial health associations at conventions and meetings.

11.4.17.4 Co-ordination

Emergency Health Services Advisory Committee

In February 1961, the Cabinet approved the formation of the Emergency Health Services Advisory Committee to assist and advise the Minister in "the discharge of his civil defence duties relating to the provision of assistance to provincial and municipal governments and to others for medical, nursing, hospital and public health services."

Special Committee

Membership of the Committee includes the Deputy Minister of National Health as Chairman, the Director of Health Services as alternate Chairman, the Chief of Emergency Health Services as Secretary, the Surgeon General, Canadian Forces Medical Services, the Director General, Dental Services, National Defence; the Director General, Treatment Services, Department of Veterans Affairs; representatives of other federal Departments and agencies and of professional associations concerned with emergency health planning; and such other persons as the Minister may consider necessary and desirable. The Committee acts as a co-ordinating body between all agencies concerned with emergency health activities.

Liaison is also maintained with the United Kingdom, United States and the North Atlantic Treaty Organization authorities.

11.5 HEALTH INSURANCE AND RESOURCES BRANCH

11.5.1 Introduction

The Health Insurance and Resources Branch came into existence on January 1, 1966. The Branch brought into its fold three sections which had had experience of up to twenty years in scientific activities and two new sections which were required to look at scientific policy in the light of two new federal programs, namely, the Health Resources Fund and Medical Care. The Branch is therefore in the fortunate position of being able to look back on experience and to look forward with anticipation.

The Branch's longest experience to date has been in the form of grants-in-aid to scientific research pertaining to public health, including health care, and to health services programs.

Experience has also been gained in the development of information and techniques to assist in decision-making and improving hospital operations. Research has been conducted into requirements and systems for physical plant, such as hospitals and health training facilities, and the gathering of facts and data related thereto. Research will be carried out to determine the present and future supply of, utilization of and needs for health manpower, the adequacy and distribution of supporting technical facilities, quality of care and methods of delivery of health services. This Branch has an increasing interest in the many interlocking factors that shape the health requirement of Canada as a whole. The following sections of this report describe how this interest has been expressed in the past, what problems have been and are being encountered, what new activities are proposed in the future and how the Branch is organized to deal with them.

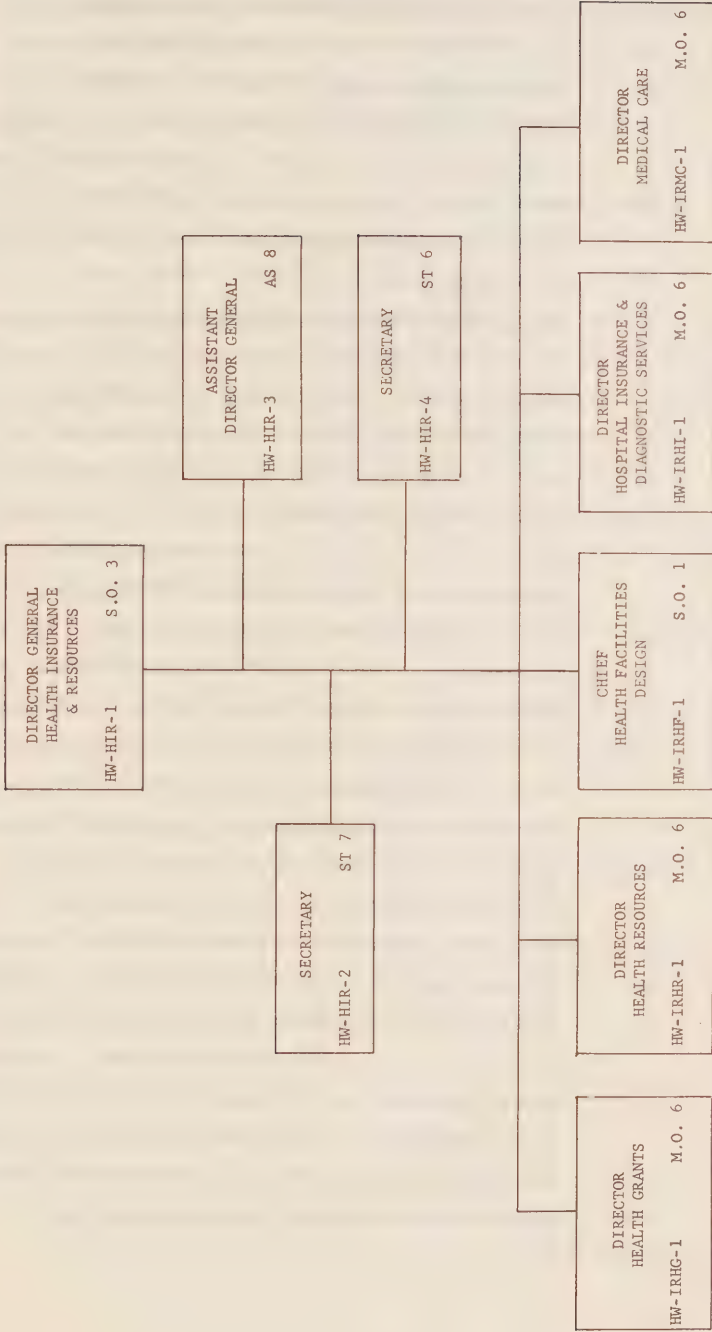
11.5.2 General Description of the Branch

The Health Insurance and Resources Branch is organized into four Directorates and one Division. These are the Hospital Insurance and Diagnostic Services Directorate, Health Grants Directorate, Health Resources Directorate, Medical Care Directorate and the Health Facilities Design Division.

11.5.3 Description of Scientific Activities

Each Directorate and Division within the Branch is, of course, responsible for conducting scientific activities within its own field of responsibility. A brief description of the scientific activities of each of the Directorates and Division is made in the following sections of this Brief. Co-ordinating mechanisms are also described in more detail under these sections.

NATIONAL HEALTH AND WELFARE
HEALTH INSURANCE AND RESOURCES BRANCH - 1
GENERAL ORGANIZATION



11.5.3.1 Health Grants Directorate11.5.3.1.1 General Administrative Arrangements and Responsibilities

This Directorate is responsible for the administration of a grants-in-aid program providing assistance for projects in the field of prevention of disability or disease, operational or administrative studies, epidemiological studies, and studies related to environmental health. The Directorate has a total staff of 14, and an annual administrative budget related to scientific activities in the order of \$30,000. to \$50,000.

11.5.3.1.2 History of the Health Grant Program - Evolution of Policies

The program, inaugurated in 1948, makes federal grants available to the provinces for the developing and strengthening of public health and hospital services. Changes have been made over the years to provide additional funds, to increase flexibility, and to meet changing circumstances. Table 1 shows the changes in the grants structure and the present arrangement under nine continuing grants as follows: Professional Training, Hospital Construction, Mental Health, Tuberculosis Control, Public Health Research, General Public Health, Cancer Control, Medical Rehabilitation and Crippled Children and Child and Maternal Health. During the period from 1948 to 1966 the total grant expenditure was \$663. million, representing 80 per cent of the available funds. This percentage increased during the period, while the annual appropriation has more than doubled from the original \$30. million annual outlay. The largest single grant has been directed to hospital construction. Up to March 31st, 1967, assistance for construction of hospital beds and auxiliary accommodation had been approved for 125,898 hospital beds and 15,636 bassinets, 24,012 beds for nurses, and 919 beds for interns. Continuing federal expenditure under the General Public Health Grant, the second largest grant, has assisted the provinces in maintaining and extending vigilance by local personnel across the country against communicable diseases and environmental health hazards.

Other grants are designated for specific areas of service, such as the prevention and treatment of mental illness and tuberculosis, cancer control, reduction of infant mortality and improvement of maternity, infant and child care, medical rehabilitation and prevention and treatment of crippling conditions in children and adults.

Emphasis has changed in the research which is assisted under the Health Grants. Since September 1966, to be approved under the Public Health Research Grant a project must show a direct relationship to one of the following aspects of public health: prevention of disease or disability; operational or administrative studies to improve health services; epidemiological studies; or environmental health. Most research in bio-sciences and in the clinical fields is therefore excluded from the Public Health Research Grant unless it bears some special relationship to the four areas mentioned.

11.5.3.1.3 The Professional Training Grant

The Professional Training Grant was one of the original ten grants established in the National Health Grant Program of 1948. The amount of the fund was increased in 1960-61 to \$1,744,200. and was placed on a per capita basis so that the amount available each year is dependent on the population.

The purpose of the Grant is to train health personnel as a means towards providing well prepared staff for health services in the provinces. It is used in three different ways:

- 1) to provide bursaries to individuals who in return give service to the sponsoring province for a specified period of time,
- 2) to provide short courses for institutes varying from a matter of days to three months,
- 3) to establish new training programs and to expand existing facilities to accommodate more students.

Since 1948 more than 46,000 health and hospital personnel have received grant funds for special training and in 1966-67 alone more than 6,000 health workers were employed with grant assistance.

Nurses have received more training assistance from the P.T.G. over the past twenty years than any other group of health personnel. A total of 19,462 nurses have received assistance.

11.5.3.1.4

Financial Assistance Provided to Universities and National Learned Societies for Research

In addition to the financial aid provided to Universities for research under the Health Grants Directorate, it is to be noted that \$409,130. was provided in 1966-67 and an estimated amount of \$531,207 was made available in 1967-68 for research to other agencies under the Public Health Research Grant, and that a special grant of \$182,000 was made available in 1967-68 to the Narcotic Addiction Foundation of British Columbia in extending its program of research and development of services for the treatment and rehabilitation of drug addicts, and an amount of \$29,357 was made available in 1967-68 within the terms of the Mental Retardation Grant, to the National Institute for Mental Retardation. Five national learned and professional societies namely:

The Royal College of Physicians and Surgeons of Canada;

The College of General Practice of Canada;

The Canadian Public Health Association;

The Association of Canadian Medical Colleges;

The Canadian Physiotherapy Association;

received a total of \$30,000 in 1966-67 and again in 1967-68 by arrangement for the purposes of performing special studies and activities on request of the Department.

11.5.3.1.5

System Appraisal of Projects (See Section 11.4.3, Research and Development)

A formal system of appraisal is applied to most research projects with applicable rules being approved by the Treasury Board or Governor-in-Council as the case may be. Most of these projects are submitted with the approval and through the provinces to whom the grants are made. For those projects coming within the Public Health Research Grant of the General Health Grants Rules, an Advisory Committee of the Dominion Council of Health gives initial approval in principle, with the project being reviewed in detail, when submitted, by consulting experts in the field who may, or may not be employees of the Department of National Health and Welfare.

TABLE 1 - AMOUNTS AVAILABLE AND AMOUNTS AND PERCENTAGES EXPENDED UNDER THE NATIONAL HEALTH GRANT PROGRAM, BY GRANT, FOR THE EIGHTEEN-YEAR PERIOD ENDED MARCH 31, 1966, AND FOR THE YEAR ENDED MARCH 31, 1967

GRANT	1948 - 1966 Period (1)			Year Ended March 31, 1967 (2)		
	Amount Available	Amount Expended	Percentage Expended	Amount Available	Amount Expended	Percentage Expended
Crippled Children (3)	\$ 6,207,728	4,431,677	71	\$ -	-	-
Professional Training	17,191,644	16,547,735	96	1,411,376	1,447,950	103
Hospital Construction	252,419,132	233,945,344	93	20,367,320	16,473,944	81
Venereal Disease Control (4)	5,968,336	5,146,209	86	-	-	-
Mental Health	126,734,488	107,531,187	85	6,254,322	6,030,278	96
Tuberculosis Control	67,968,562	63,720,635	94	1,202,903	1,641,797	136
Public Health Research	18,640,558	16,286,456	87	4,501,330	4,242,903	94
Health Survey (5)	645,180	540,960	84	-	-	-
General Public Health	173,624,051	125,007,662	72	12,113,371	11,282,604	93
Cancer Control	62,489,353	45,476,985	73	1,387,630	1,122,426	81
Laboratory and Radiological Services (6)	47,404,300	14,450,881	30	-	-	-
Medical Rehabilitation (7)	6,500,000	3,016,750	46	-	-	-
Medical Rehabilitation and Crippled Children (8)	16,410,550	11,157,137	68	2,071,457	1,876,895	91
Child and Maternal Health (9)	22,173,700	15,320,900	69	1,351,012	826,809	61
TOTAL	824,377,582	662,580,518	80	50,660,721	44,945,606	89

(1) Amounts available as set out in the Orders-in-Council and amounts expended for all types of grants to all provinces.

(2) Figures for the year ended March 31, 1967 apply to grant allocations and payments for public health research and hospital construction in all provinces but exclude the respective amounts under all other types of grants which apply to Quebec. A total of \$10,113,679 in amounts available to Quebec and an estimated expenditure of \$9,600,000 representing Quebec's share through tax rebate under the Established Programs (Interim Arrangements) Act are therefore not included. Distribution by grant of the 1966-67 payments made to Quebec will be available for inclusion in the next edition. Expenditures may exceed 100 per cent of amounts available through transfer of unexpended funds from one grant to another or, in the case of the Hospital Construction grant, through revote of funds unused in previous years.

(3) Merged with Medical Rehabilitation Grant, April 1, 1960.

(4) Absorbed into General Public Health Grant, April 1, 1960.

(5) Lapsed in 1953 following the completion of provincial health surveys.

(6) Introduced in 1953 and absorbed into General Public Health

(7) Introduced in 1953 and merged with Crippled Children Grant, April 1, 1960.

(8) Amounts for 1960-66 only; see footnotes 3 and 7.

(9) Introduced in 1953.

11.5.3.2. Hospital Insurance and Diagnostic Services Directorate11.5.3.2.1 Responsibilities and Administrative Arrangements

This Directorate is responsible for the administration of the Hospital Insurance and Diagnostic Services Act which came into effect on July 1, 1958, and to develop and improve the provision of hospital care services to all Canadians regardless of their individual financial circumstances. The Directorate provides consultative services to health agencies on research and training hospital personnel and has developed a small study unit which conducts or sponsors research into hospital services and operating problems. The Directorate has a total staff of thirty-six and an annual administrative budget related to scientific activities in the order of \$100,000.

Although a few research projects are conducted by individual members of the study unit, most research projects are performed by researchers in the field who receive financial support from the Public Health Research Grant administered by the Health Grants Directorate. These projects are therefore subject to the appraisal mechanism which applies to all projects submitted for support under the General Health Grants Rules.

The Estimated annual expenditure on projects conducted by members of the study unit or research contracted by the Directorate is \$40,000 in 1967-68 and \$50,000 for 1968-69.

11.5.3.2.2 Specific Objectives

The objectives of the Hospital Insurance and Diagnostic Services Directorate are:

assisting in the achievement for the residents of Canada of a balanced and integrated hospital system of a quantitative and qualitative nature which will permit access to the resources, both in reasonable travel time and waiting time, and the services of the hospital system to be so distributed that they can be achieved in high quality and economic cost; that at present these services be available on the basis of medical need and operated through an insurance program administered by the provinces with financial participation by the federal government under an arrangement with individual provinces.

11.5.3.2.3 Activities

The Directorate's activities are:

- to have adequate administrative, technical and applied research staff and resources to be able to provide technical and professional consultative services to the provinces and interested bodies and undertake studies, projects, applied research, and planning related to the need, supply, operational efficiency and utilization of hospital resources as part of the total health needs of the residents of Canada;
- to provide funds to the provinces in accordance with the Hospital Insurance and Diagnostic Services Act and the Hospital Insurance Supplementary Fund.

11.5.3.2.4 Interest in Scientific Activities

The Directorate carries on a three-fold program as outlined previously. These activities may be defined as:

- 1) Administration of the Hospital Insurance and Diagnostic Services Act, and
- 2) Consultation to improve existing programs;
- 3) Research and development to develop information and techniques to assist in decision-making and improvement of existing programs.

11.5.3.2.5 Objectives of Scientific Activities

The objectives for which scientific activities are used can be listed as follows:

- a) To improve the standard of patient care in hospitals
- b) To effect more optimum utilisation of all categories of hospital personnel.
- c) To improve the effectiveness of all hospital departments.
- d) To assess, plan and improve existing hospital physical facilities.
- e) To advise, through functional planning on new hospital facilities.
- f) To advise on nursing, medical and paramedical education.
- g) To recommend procedures to improve the hospital system so that hospitals in a community or region or province may be better integrated and balanced to meet the needs demonstrated on an integrated basis.

- h) Develop techniques to improve decision-making by the development of adequate data, more precise definition and criteria for decision-making.
- i) The development of decision-making techniques employing operational research system analysis and other techniques to effect the optimum utilization of resources.
- j) To disseminate information to agencies, departments, governments, provincial authorities and others who are in the decision-making process.
- k) The assimilation of data deemed necessary for consultation and research and development projects as well as disseminating information to interested agencies, departments, governments provincial authorities and others.
- l) Coordination of committees of agencies, departments, governments, provincial authorities and others so as to eliminate duplicative efforts.
- m) Development of evaluation techniques to assess changes recommended to various aspects of the health care system.

11.5.3.2.6 Research and Development Activities and Activities Related to Training and Scientific Manpower Carried on by the Consultants and the Hospital Services Study Unit

11.5.3.2.6.1 Research and Development

The Directorate staff is providing the following services:

a. Conduct

Conducting applied research into hospital services and operating problems following discussion with an invitation from provincial health authorities and other interested bodies.

b. Planning and Administration

Selecting and proposing areas for applied research activities and reviewing and evaluating research proposals from the field for recommendation of financial support or to assist those conducting research to improve objectives of research, design and conduct of research.

c. Support

Provide consultative services on request; conduct progress review and evaluation of conducting research project.

Support by contract for specific research, as well as contract for supplemental specific research as required to assist activities presently being carried on by others or by members of the study unit.

11.5.3.2.6.2 Training of Scientific Manpower

Members of the Directorate are actively interested in the maintenance and development of contacts with administrators and organizers of training facilities with a view to insure an early appreciation by the students of the need for all the techniques of applied research in the hospital field and by direct activities with various associations, universities, etc., as concerned.

- Speaking at National and Provincial nursing, hospital and dietetic association meetings.
- Lecturing at University Schools of Nursing.
- Planning and conducting workshops, institutes, conferences and courses of instruction.
- Assisting with the planning of Montebello Conference for Doctors, Hospital Administrators, Hospital Board members and Directors of Nursing.
- Provides consultation to University Schools of Nursing and diploma schools of nursing on curriculum.
- Provides consultation to provincial nursing, hospital and dietetic associations on programs for annual meetings, continuing educational programs, etc.
- Reviewing professional training grant proposals and recommending or not recommending support.
- Serving on Canadian Nurses' Association Committee on Higher Education for nurses in Canada.
- Co-Chairman of Continuing Education Committee, Ottawa Chapters of Registered Nurses' Association of Ontario
- Plans and conducts refresher courses for inactive nurses and conferences for active nurses.

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- Serve on Canadian Nurses Association Committee to plan regional workshops for Directors of Nursing.
- Contributing to the education of students in hospital administration and foreign nursing students and visitors by providing experience in our directorate.
- Serving as a reader "or Masters' theses of Hospital Administrator students.
- Orienting and training provincial nursing consultants and new personnel in the directorate.
- Facilitates the coordination of the services of departmental consultants in related areas as required. This is done by bringing them in on projects when possible and conferring with them on overlapping areas of concern.
- Member of Joint Committee Nursing Unit Administration Extension Course.
- Participate with Senior Hospital Administration Consultant in orientation and training of other consultants in directorate:
 - by participating in selection of all consultants for the directorate;
 - by participating in drawing up job specifications, experience and education needed;
 - by being a member of the Civil Service Board which interviews applicants and selects the successful candidate.
- On request of provinces, does orientation and training of provincial counterparts.
- On request of provinces, is a member of selection committee for provincial nursing consultants.
- On request, trains hospital personnel by giving lectures, conferences, etc.

Staff for these positions are approximately ten resource personnel and ten supporting personnel.

11.5.3.2.7 Co-Ordinating Mechanisms

<u>Descriptive Title</u>	<u>Employer</u>	<u>Purpose of Contacts</u>
Premier of Province	Provincial Government	On request, to recommend standards of nursing education, service and staffing.

<u>Descriptive Title</u>	<u>Employer</u>	<u>Purpose of Contacts</u>
Ministers of Health	Provincial Government	Recommend programs, staffing and service in nursing.
Deputy Minister of Health and related Ministers	(Labour, Welfare and Finance)	Recommend programs, staffing and service in nursing and recommend equipment.
Deans, University Schools of Nursing	University)	Recommend curriculum and continuing education programs.
)	
Deans, University Schools of Hospital Administration	University)	Recommend program of consultants, standards of nursing service and staffing, equipment etc.
Director and personnel of Provincial Hospital Insurance Authorities	Province)	
)	
Executive Director	Canadian Nurses' Association	Discuss and recommend aspects of program, e.g. conferences.
Executive Director	Canadian Hospital and Canadian Medical Association	
Executive Director	Provincial Nurses Association	Recommend approaches conferences, projects
Chief Nurse	World Health Organization Headquarters	
Chief Nurse	Ministry of Health - other countries	By correspondence, give information on Canadian standards and practice
Administrators of individual hospitals, Directors of Nursing of individual hospitals		Recommend operation, activities, techniques, procedures, staffing, etc.
Directors of other Directorates	Federal Government	Discuss, recommend standards, projects, etc.
Director General of own Branch	Federal Government	Discuss need for personnel program, etc.
Canadian Dietetic Association		Dissemination of information, receipt of information.
Nutrition Society of Canada		
Canadian Food Technologists' Association		
International Nutrition Society		
Canadian Hospital Association		

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11.5.3.3 Health Facilities Design11.5.3.3.1 Authority

This unit was established by Order-in-Council P.C. 186/7500 in 1945. It was then called the Hospital Design Division.

11.5.3.3.2 Functions and Objectives

The Health Facilities Design Division provides a professional and technical consulting service to federal, provincial and other agencies, primarily concerned with the architectural, engineering and construction cost aspects of health facilities. The objectives of the division with respect to research investigations are:

- a) To provide accurate information based on operational research to assist in decision making with respect to environmental control systems, analyses of building space requirements, construction cost estimates and other management decisions with regard to capital investment in buildings and equipment.
- b) To assist in developing practical and positive recommendations related to improved planning and construction techniques for acquired new renovated physical facilities for healing, teaching and research.

11.5.3.3.3 Interest in Scientific Activities

- a) Consultants in HFD become involved in the conduct of fact gathering projects related to research and development of physical plant.
- b) The planning and administering of extramural operational research projects related to requirements and systems for physical plant.

11.5.3.3.4 Scientific Activities - HFD responsibility

The following is a list of current projects:

Extramural

- 1) Study of air conditioning and filtration for surgical suites and evaluation of air recirculation and heat exchanger systems.

Intramural

- 1) Study of air currents in the immediate environment of surgical operating procedures using the Schlieren technique and cine photography.
- 2) Study of total heat and electrical energy demand requirements for specific hospital departments.
- 3) Design criteria study of University of British Columbia Health Sciences Centre.
- 4) Study of health facility construction cost data reports.

11.5.3.3.5 Coordinating Mechanisms

The HFD division has collaborated with the following:

- (a) Learned and professional societies:
National Research Council - Division of Building Research;
Gas Dynamics Laboratory.
- (b) Health organizations - Manitoba and Ontario Hospital Services Commissions.
- (c) Universities - UBC Health Science Centre (area requirements analysis);
- Queen's University, Department of Physics
(radio frequency shielding).

11.5.3.4 Health Resources Program11.5.3.4.1 Authority

This Directorate was formed within the last two years to administer the Health Resources Fund Act.

11.5.3.4.2 Functions and Responsibilities

The Health Resources Program is concerned with the human resources in the health fields in Canada. The purpose of this activity is to develop and improve the supply, quality and utilization of trained health power in Canada by:

- (a) providing technical and professional consultative services to the provinces and other appropriate bodies;
- (b) the undertaking of studies, projects and planning related to the need, supply, quality and utilization of health manpower;
- (c) providing financial assistance to the provinces by making contributions of up to 50% of the capital costs of constructing, acquiring or renovating health training facilities.

This activity is comprised of two sub-activities:

- (a) the payments out of the Health Resources Fund established under the Health Resources Fund Act, and
- (b) the administration and operating expenses of the Health Resources Directorate who administer the activity.

11.5.3.4.3 Objectives

The objectives of the Health Resources Directorate who administer this activity are to:

- (a) encourage the construction of teaching and research facilities for health personnel within the limitations of permissible expenditure for the Health Resources Fund;
- (b) develop practical and positive recommendations for action to improve the quality, quantity and utilization of health manpower of Canada;
- (c) conduct and support operational programs to improve the quality, quantity and utilization of health manpower.

11.5.3.4.4 Interest in Scientific Activities

The program supports the creation of health training facilities through contributions from the Health Resources Fund. The capital costs of health research facilities are supported to the extent they are needed for educational purposes.

11.5.3.4.5 Scientific Activities under Health Resources Responsibility

- (a) This Fund provides assistance to provinces in meeting the capital costs of constructing, renovating, acquiring and equipping health training and research facilities. A sum of \$500. million has been appropriated for contributions of up to 50% of those costs during the 15 year period 1966 to 1980.

The Fund is divided into three parts:

1. \$300 million - allocated to provinces on a per capita basis
 2. \$ 25 million - a special additional allocation to the four Atlantic provinces for joint projects
 3. \$175 million - to be allocated by the Governor-in-Council
- The money is being spent on new and improved health training and research facilities which are defined in the Act as schools hospitals or other institutions, or any portion thereof, for the training of persons in the health professions or any occupations associated with the health professions, or for conducting research in the health fields.

The costs of planning and designing the facility and of all basic equipment required for its operation are also eligible for support, but costs of land, interest charges and residential accommodation are excluded.

The Fund will pay up to 50% of these capital costs, while some other agency such as the Provincial Government or the University provides the remainder. Payments are made from the Fund to the provinces as work proceeds on the projects.

Operating costs of education and research are not eligible under the Health Resources Fund.

- (b) The present strength of the Directorate is 8
- (c) It has an annual administrative budget related to scientific activities in the order of \$30,000.

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- (d) Payments from the Health Resources Fund in 1966/67 were \$4,704,789.88 of which \$2,144,000. went towards research. Payments from the Health Resources Fund in 1967/68 were \$32,149,712.52 of which \$10,034,000. went towards research.

11.5.3.4.6 Coordinating Mechanisms

This Directorate has already and may in future collaborate with all agencies listed in Section 11.5.3.5 entitled "Coordinating Mechanisms".

11.5.3.5 Medical Care11.5.3.5.1 Introduction

The Medical Care Directorate is responsible for the development of a national, comprehensive personal health care program in accordance with the provisions of the Medical Care Act, 1966. This Act permits the federal government to contribute, after July 1, 1968 approximately half of the costs of provincial and territorial medical care plans which meet certain minimum requirements with respect to universal availability, public administration, comprehensiveness of insured services and portability of benefits. During the first two years of the program, universality is defined as meaning that not less than 90% of the total insurable residents of a participating province or territory are entitled to insured services. The minimum level will be raised to 95% in subsequent years.

The insured services initially will be those services rendered by medical practitioners which are medically required and excluding those for which a person is eligible under any other Act of the Parliament of Canada or under any law of a province relating to workmen's compensation. The Medical Care Act contains a provision which will allow the federal government to extend the benefit coverage when this is deemed to be advisable. The recommendations of the Royal Commission on Health Services will have an influence on the selection of any additional personal health care services which may be included in the program. It may be recalled that the Commission recommended that the federal government should participate in an expanded program which would include optical services for children, expectant mothers and public assistance recipients, prosthetics, home care services and prescription drugs.

The main objectives of the federal Medical Care program are:

- to ensure that all Canadians have access to necessary medical care regardless of the individual's financial circumstances;
- to improve the health of the nation by facilitating early diagnosis and treatment;
- to encourage improved distribution, quality, organization and delivery of health services; and
- to develop the insured services covered by the federal program.

11.5.3.5.2 Interest in Scientific Activities

The Medical Care Directorate is interested in basic and applied research which will have significance for its operational program. The results may affect future scientific training requirements but these are not a direct responsibility of the Directorate. At present, the federal program is in a formative stage during which the provinces and territories are deciding whether to participate from the beginning or continue with whatever plans might be in effect for the present. The general pattern of provincial participation in federal-provincial joint programs has been for some provinces to participate from the beginning of a program and others to enter later when the provincial governments concerned have decided that the time is opportune. It is expected that most provinces and territories will be participating before the end of the first full fiscal year, 1969-70.

It is anticipated that research requirements will increase considerably by that time and a target figure equal to 1% of the program costs has been suggested. This modest percentage for research is justified on the basis that there must be adequate provision for ensuring that the best possible return is obtained from the vast sums of public money which will be committed to personal health care services. Much of the research will involve special studies or demonstration projects on an extramural basis and require financial support from the federal government. It is hoped that the financial requirements will be included in the budget of the Medical Care Directorate, failing which it is hoped that an adequate supply of funds will be forthcoming, when required, from a system of federal grants whereby the federal government may instigate appropriate research projects on its own without the necessity of waiting until some province becomes interested as at present under the Public Health Grants.

The areas in which studies are required include:-

- present and future health needs for medical and other practitioners, taking into consideration such factors as specialization, turnover, patient load, under-doctored areas, training and changing responsibilities

- adequacy and distribution of supporting technological facilities
- quality of care, including analysis of the effectiveness of the various types of practice arrangements, with special reference to the alleviation of disability, discomfort and dissatisfaction
- economics of medical practice, including utilization studies and measurement of input versus output
- methods of delivery of insured services to ensure that the most efficient use is made of various types of health personnel and that the problems of serving medically deprived or under-doctored areas are resolved.
- changing patterns of medical practice, especially in the case of physicians providing primary medical care
- regional co-ordination of all health services, institutional and non-institutional, government and voluntary.

Research in these areas of concern would have very definite practical objectives of contributing to the provision of high quality care in the most efficient and appropriate manner. In addition the importance of preventing a collision course being followed between demand and need for health services due to a growing population and rising expectations, and a dwindling supply of physicians to render primary medical care. The Royal Commission on Health Services reported that Canada had the following ratios of population per active civilian physician during the last 50 years:

1921 -	1,008
1931 -	1,034
1941 -	968
1951 -	976
1961 -	857

The current improved ratio only tells part of the story as approximately half of Canadian medical graduates are entering specialties and of the total civilian physicians in Canada in 1961, 37.3% were non-certified specialists. The trend to specialization is further illustrated by there being a 94.5% increase in certified specialists

between 1955 and 1965, for a total of 9,423, compared with a 4.1% increase in general practitioners, for a total of 10,221. (By way of contrast there were 10,672 general practitioners at the end of World War II or about 4% more at that time). The Canadian population increased by 18% during this ten year period. Some primary medical care is, of course, provided by specialists but at the same time a growing number of physicians are becoming involved in largely non-clinical activities such as administration, teaching and research.

The current system cannot be relied on to stand future strains which will be imposed on it in the long haul without imaginative developments and these will only result from research and demonstration projects and the encouragement of new ideas. Hence the requirement for sufficient funds to be available for appropriate studies.

11.5.3.5.3 Scientific Activities Undertaken 1966-67 and 1967-68

Significant research could not be undertaken as the Medical Care Directorate was in an embryonic stage. However, an economic survey of the professional income and practice expenses of physicians according to specialty and location was started with the co-operation of representatives of the medical profession and the Department of Finance.

No other funds were spend on research projects during these years. Future research activities will depend on the availability of staff and resources and if these are forthcoming the research will be along the lines indicated. If current Directorate proposals are realized, much of the research will be done on an extramural basis with the federal government providing the necessary guidance and financial support. However, extensive analysis and comparison of data from the various provincial plans will be conducted centrally.

The Director, Medical Care, has been associated with the International Collaborative Study on Medical Care Utilization during 1968 and will maintain this association until the study is completed. The Director and Principal Medical Study Officer of the Medical Care Directorate

have accepted an invitation to serve on the National Research Advisory Committee of the College of General Practitioners of Canada. The estimated administrative budget expense in 1967-68 which could be related to research activities is \$5,000.

11.5.3.5.4 Co-ordinating Mechanisms

- (1) Senior officials of provincial medical care plans to assist with the evaluation and development of personal health care programs and proposals, to facilitate co-operation with the federal Medical Care program and to remain knowledgeable of developments in other provincial health activities.
- (2) University faculty members, Canadian and foreign, to exchange expert opinions and obtain advice on specific aspects and desirable developments in connection with personal health care programs. For example, the Director maintains liaison with Professor Kerr L. White, head of the Division of Medical Care and Hospitals, Johns Hopkins University School of Hygiene and Public Health, which is interested in possible "internships" for its graduate students in Canada to take advantage of the unique data which is available here from the Hospital Insurance and Diagnostic Services Program and will soon be from the Medical Care program. No comparable data on a national basis is available anywhere in the western world. Again, liaison is established with the School of Hygiene, University of Toronto, with reference to possible future Canadian developments of a similar nature.

As a by-product of International Collaborative Study of Medical Care utilization, the Director is closely associated with the Professors of Community Medicine at the University of British Columbia, University of Alberta and University of Saskatchewan which have requested close involvement of the Department of National Health and Welfare in effectively forming an all Canadian subgroup of the Study.

- (3) Senior officials of professional health associations and agencies to exchange information of mutual interest and obtain assistance when required. For instance, the Director is a member of the

Ontario Medical Association Committee on Economics and Medical Practice, and has been a member of the Canadian Medical Association Committee on Collective Negotiation. He has met frequently with various Canadian Medical Association committees. The Canadian Medical Association has recently established a new Medical Care Committee, one of whose main functions will be the maintenance of a close working relationship with the Department, particularly in the field of research and studies relating to medical practice. Frequent contacts are also had with officials of other provincial medical associations on matters of mutual interest.

- (4) Representatives of foreign health departments to exchange views, particularly regarding program content. Such contacts are facilitated by the Director's involvement in the International Collaborative Study of Medical Care Utilization (in which experts from the United States, Great Britain, Yugoslavia, Finland, Poland, Chile and Canada are involved). Direct contacts are also made with visiting officials, principally from other Commonwealth countries.
- (5) Liaison with Research and Statistics Branch of the Department of National Health and Welfare and Medical Research Council on an ad hoc basis relating to particular research problems.
- (6) Collaboration with other Directorates of the Health Insurance and Resources Branch to facilitate the development of the national health program.

11.6 MEDICAL SERVICES BRANCH

11.6.1 Functions and Responsibilities

The Medical Services Branch of the Department is organised as a service and regulatory agency to protect and promote the health of various categories of persons, chiefly the travelling public and indigenous ethnic groups, outside the jurisdiction of normal provincial health services.

The functions of the Branch are:

1. The administration of the Quarantine Act and subordinate regulations.
2. The administration of the Leprosy Act.
3. The administration of Part V of the Shipping Act re Sick Mariners
4. The provision of medical advice to the Department of Transport in relation to the physical and mental fitness of Civilian Air Services personnel, licensed private pilots, and certain other personnel manning remote weather stations etc.
5. To assist in the medical investigation of aircraft accidents.
6. The routine medical examination of foreign merchant seamen joining Canadian ships and Canadian seamen before joining foreign vessels.
7. The medical assessment of harbour and river pilots.
8. The operation of a federal employee health service oriented towards
 - a) the protection and promotion of the health of Public Servants
 - b) advising employing departments and agencies in solving problems relating to employee health
9. The administration of arrangements made for the treatment, health promotion and protection of registered Indians unable to meet the cost of any alternative arrangement. The objective of Indian Health Function is through planned programs supported by parliamentary appropriations to assist the responsible provincial agencies to improve the health of

Indians living on reserves and to arrange treatment for those to whom this would otherwise be unavailable through inability to pay or through absence of facilities in a local area.

10. Under the terms of a special arrangement with the Territorial Governments, to provide the services normally rendered by a provincial health department to the populations inhabiting the Arctic territories until such time as these governments can establish alternative services. The objective is through successive 5-year health plans, supported by annual parliamentary appropriation and appropriation of funds from territorial government sources on a formal cost-sharing basis, to provide preventive and corrective health care to residents of the two northern territories.

To provide advice in the fields of medicine and related sciences to residents, local agencies, local governments and other government departments based on medical knowledge, medical experience in the area and on medical research.

No responsibility is prescribed by any statute in relation to Indian health or northern health.

11.6.2 Scientific Fields of Interest

The entire operation of medical services is oriented toward practice of the medical sciences. Although primarily oriented toward practice, research is necessary in relation to problems peculiar to the areas of operation.

11.6.3 Scientific Activities

- (a) Research on Eskimo nutrition.
- (b) Research on Indian and Eskimo carbohydrate metabolism including metabolism of alcohols.
- (c) Investigation of the protective action of ethyl alcohol in treatment of methyl alcohol poisoning.
- (d) Research into all phases of amoebiasis including serology with the overall objective to discover why tissue invasion occurs in certain individuals.

- (e) Research in relation to Casoni antigens obtained from various animals.
- (f) Research related to protection of patients from the elements during evacuation from northern outposts.
- (g) Clinical trials of new drugs in chemotherapeutic treatment of tuberculosis.
- (h) Clinical trials of new drugs in chemotherapeutic treatment of amoebiasis.
- (i) Clinical trials of live measles vaccine.
- (j) Clinical trials of autogenous meningococcal vaccine.
- (k) Research into the design of systems for the delivery of potable water to northern and isolated settlements.
- (l) Research into the design of systems for the disposal of sewage in arctic, sub-arctic and isolated communities.
- (m) Investigation and prescription of sanitary requirements in relation to community planning.
- (n) Research on virus and respiratory tract infections.

11.6.4 Distribution of research activities

Headquarters, Regional, Zone or Area administrative and field officers participate as necessary. The total cost would involve less than 1% of the Medical Services budget annually.

11.6.5 Relations to Universities, Research and Training

11.6.5.1 General

The Branch frequently arranges to facilitate field trials of new vaccines and drugs for research workers through its facilities and occasionally stimulates research projects, usually undertaken by University research personnel, to solve specific problems or gain some new insight. In addition, the Branch has a number of agreements with several University Faculties of Medicine whereby senior medical undergraduate students can gain experience in Branch hospitals and health centres under the tuition of their University tutors and specialists who donate their services for the time being to those institutions. Similar arrangements for public health nursing personnel-in-training exist with several training schools for

nurses. These arrangements seldom involve any expenditure of Medical Services funds, except occasionally some additional cost for board and lodging or small remuneration to students doing full time summer work but they are a real contribution towards the training of future Canadian physicians and nurses. However, detailed analyses of results and costs are not available.

11.6.5.2 School of Frontier Medicine

A unique example of the above type of arrangement was the Summer School of Frontier Medicine organised at Inuvik, August 12, to September 3, 1967 under the sponsorship of various major medical associations, the Northwest Territories Council and the Medical Services Branch as a special centennial project. The purpose of the School was to focus the attention of the Canadian medical profession and of senior medical students on the health problems in the North and to stimulate the interest of the students in serving for at least a portion of their medical careers in the North. Excluding Medical Services personnel already on the scene, the participants in this School were six selected senior medical students from each of the twelve Canadian Medical Schools, faculty of representatives, members of the sponsoring medical associations and officers of Government Departments, totalling 96 persons, 72 students, 12 professional persons and 12 Government Officials. The overall cost was \$58,000. The Medical Services Branch was authorised to expend \$30,000 on this project. The Territorial Council provided a grant of \$5,000 and the balance was provided by the sponsoring medical associations. It may thus be claimed that, in 1967 Medical Services expended \$30,000 in promoting medical education.

11.6.5.3 Northern Medical Research Unit

Inevitably certain officers become interested in doing some research into problems they encounter or in order to evaluate their programs. One such officer has shown particular interest and demonstrated aptitude for research and now heads what has been designated the Northern Medical Research Unit based at Charles Cammell

Hospital in Edmonton. Since 1963, the major part of his time has been devoted to investigating peculiarities of Eskimo metabolism in collaboration with personnel from the University of Alberta. This officer is the only member of Medical Services staff who could possibly be described as employed full time on research. He makes use of facilities provided for other purposes and could be more accurately described as a stimulator and facilitator of research projects to be done by the universities which apply for health grants in the normal way to finance them.

11.6.6 Scientific Information Activities

11.6.6.1 Staff

Medical Services are engaged in field operations arranging and giving services to persons. Field staffs are kept informed by establishment libraries of standard works of reference in all professional disciplines employed, e.g. medical, nursing, administration, nutrition, health education, environmental health, preventive medicine, etc., organized in all major or remote isolated field units and by periodic journals, bulletins, circulars, directives and memos emanating from national headquarters as occasion arises. A resources section is organized at headquarters which supplies information in answer to questions raised by field officers, educational aids and equipment, informational brochures and reports. The aim is to ensure that the professional staff, often working in isolation, have available to them the latest accepted information basic to their work, such as any well informed practitioner might be expected to have in his private library. Other information supplied is specific to the operation of the Branch activities, e.g. manuals and directives.

11.6.6.2 Public

The Branch issues information to the public on various activities, quarantine control, immigration procedures and policies by informational pamphlets, brochures, produces educational material chiefly aimed at Indians and Eskimos on health matters and issues annual reports and reports on special surveys and studies, also recruiting propaganda of various types containing information on Service conditions and activities.

11.6.6.3 Scientific Publications

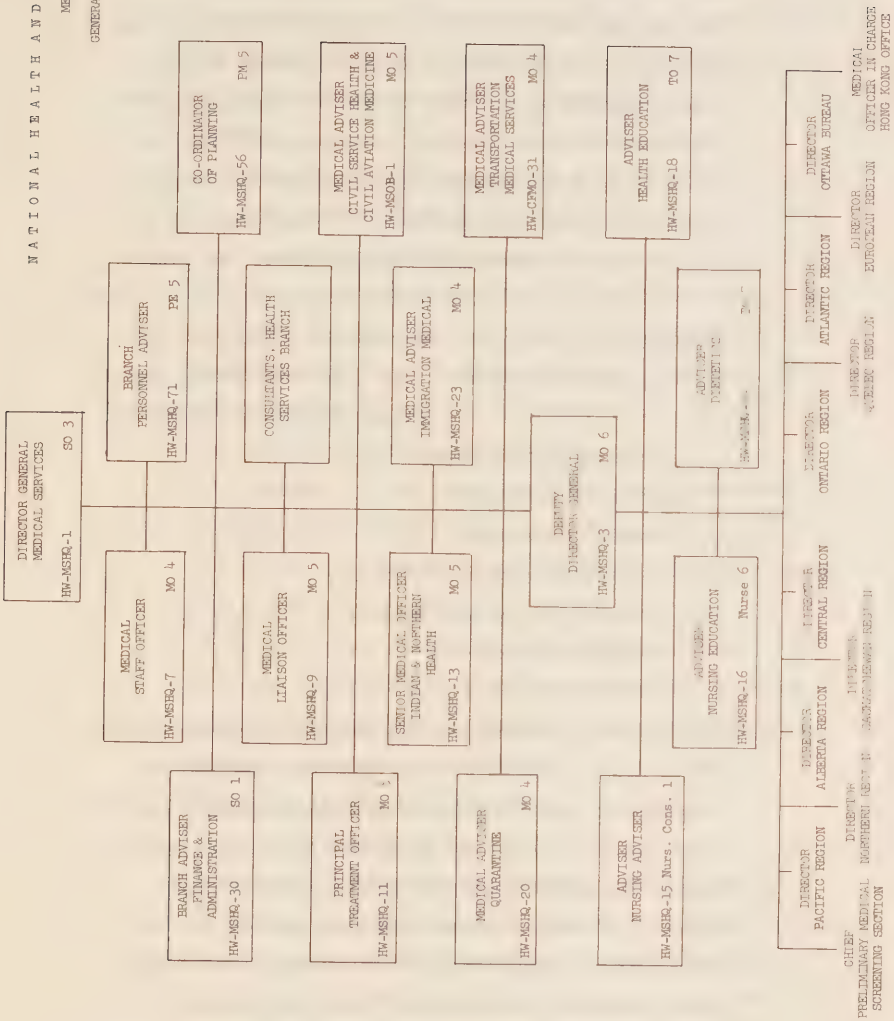
In the course of their duties, some officers are engaged in serious study and report original observations of a scientific nature. These papers are usually published in one or other of the current professional journals. On average, some six or seven such papers appear annually, covering a wide range of interests.

11.6.7 Representation and Medical Intelligence Function

The functions of departmental medical officers, members of the Medical Services overseas include representing the Department and, in certain cases, Canada, at conferences, formal and informal meetings, liaison with various national and international authorities; the collection and exchange of information concerning health and welfare legislation, practices, etc., and of scientific information of concern to the medical profession and, as appropriate, of significance in the field of the bio-sciences.

Medical officers in charge of posts within this overseas network of communications number 22 and they are strategically located namely in European capital cities, the Middle East and the Far East. One "unique tool" developed in the field of health education has been the "Community Health Worker" training program whereby Indians and Eskimos are trained in the techniques of stimulating community development. This program has been extensively publicised and has aroused international interest among health educators all over the world. It is a special application of social science to the situation of our indigenous races, experimentally in the first instance now routinely.

NATIONAL HEALTH AND WELFARE
MEDICAL SERVICES
GENERAL ORGANIZATION



11.7 FOOD AND DRUG DIRECTORATE

11.7.1 Organization, Functions and Responsibilities

The Directorate is responsible for the administration of the Food and Drugs Act, the Proprietary or Patent Medicine Act, and the Narcotic Control Act, all of which are designed to protect Canadian consumers against health hazards and fraud, associated with the manufacturing, labelling, packaging, advertising and sale of foods, drugs, cosmetics and medical devices. Recently, the control of fraud associated with foods was assigned to the new Department of Consumer and Corporate Affairs. The work of the Directorate intimately touches the daily life of all Canadians. To implement its program, the Directorate is divided into the following organizational units: (See organization chart, Food & Drug Directorate, attached.)

1. Directorate Administration
2. Bureau of Operations
3. Research Laboratories
4. Bureau of Drug Advisory Services
5. Bureau of Food Advisory Services
6. Consumers Division
7. Narcotic Division

The Directorate Administration unit comprises the central management and support services for the Directorate. The Bureau of Operations is responsible for the day-to-day enforcement aspects of the Food and Drugs Act and the Proprietary or Patent Medicine Act. It consists of Headquarters personnel at Ottawa and 5 Regional Laboratories, located at Halifax, Montreal, Toronto, Winnipeg and Vancouver. The staff of the Regional laboratories conduct laboratory examinations of foods, drugs, cosmetics and medical devices for enforcement purposes, and carry out necessary inspections of food, drug and cosmetic manufacturing facilities. The Research Laboratories are responsible for carrying out the

research needed to solve the complex technical problems associated with administration of the three Acts for which the Directorate is responsible. Such research includes the development of methods of analysis for intentional or inadvertent additives in foods, analysis of the constituents of drugs and cosmetics and for physiological, toxicological, microbiological and biochemical studies of wide scope and variety.

The Bureau of Drug Advisory Services and Food Advisory Services are responsible for evaluation of manufacturers' submissions on new drugs, food additives, pesticides, cosmetics and medical devices. This involves extensive examination of scientific literature and data and a high degree of scientific judgment. In addition, the Bureau of Drug Advisory Services collects and disseminates information through the poison control centres across Canada and operates an adverse drug reaction reporting program.

The Consumers Division is responsible for providing information on foods, drugs, cosmetics and medical devices to the public and interested organizations, and also collects information, opinions and suggestions from the public.

The Narcotic Division is responsible for administration and enforcement of the Narcotic Control Act and Part III, Controlled Drugs, of the Food and Drugs Act. The work primarily involves inspection and licensing activities.

11.7.2

Description of Scientific Activities

Research and Development

Almost all of the Research and Development activities of the Directorate are carried out by the Research Laboratories, although a small amount of short-term research is conducted by staffs of the two Advisory Bureaus and limited methodology evaluation is carried out by the staffs of the Regional Laboratories. All research is problem-oriented; since the Directorate does not have a basic research function, research projects are related to a requirement for technical information to protect consumers against health hazards and fraud.

The Research Laboratories are divided into five research Divisions, each headed by a scientist with an international reputation in his field, plus three service sections. Each Division contains several sections. The Research Divisions are as follows: Pharmacology, Food, Nutrition Research, Pharmaceutical Chemistry, Microbiology. A well equipped Animal Care Unit, headed by a competent veterinarian, provides experimental animals.

11.7.2.1 Staff

The staff of Research Laboratories includes both professionals, most of whom are trained to the doctorate level, and technical support staff. Numbers of staff are shown below for the past two years.

<u>Staff</u>			
<u>Year</u>	<u>Professional</u>	<u>Support</u>	<u>Total</u>
1967-68	99	100	199
1968-69	104	108	212

Approximately 85% of professional staff hold a doctorate degree (Ph.D., M.D. or D.V.M.).

11.7.2.1.2 Budget

The budget for the Research Laboratories is as follows:

	<u>1967-68</u>	<u>1968-69</u>
Salaries	1,650,000.	1,896,000.
Operating Expenses	263,000.	303,000.
Equipment	246,000.	253,000.

11.7.2.1.3 Research Management

The Research activities of the Directorate have expanded markedly during the past few years. At present, there are over 100 active projects under investigation. This marked increase in research effort has made ever more apparent the need for a formal system for initiation and review of research projects. The following brief summary provides information on the processes and procedures involved in the genesis and execution of research projects.

(a) Generation of New Research

The work of Research Laboratories is designed to fit into the overall priority schedule of the Directorate, with which the scientists of Research Laboratories are generally familiar. All research projects start as an idea, which may arise from several sources. Very often a project originates in the mind of a research scientist working in a specific area, or comes from the interaction of several scientists working as a team. Recent evidence on the social factors related to performance in a research organization has pointed out clearly that the level of scientific performance is highest when scientists have frequent (daily) contact with several scientific colleagues who on the average have been employed in settings different from one's own, who stress values different from one's own. For this reason, a real attempt is made in Research Laboratories to encourage the sort of group interaction and "cross-fertilization" of ideas that lead to the generation of new research projects. For example, a considerable number of informal "study groups" have been established which permit scientists with similar interests working in the various Divisions to discuss areas of mutual interest. The idea for a research project also may come "from the top down" from the Division Chief, who has a broad knowledge of a large field and hence is able to conceptualize effectively in a research area, or from the Director of Research. It also may come from units of the Directorate other than Research Laboratories. Because of their close involvement with practical problems in the field, staff of the regional laboratories are in a particularly good position to realize the existence of problems requiring research for their solution. In order for Research Laboratories to carry out their function properly, it is important that these ideas be transmitted to the Director of Research for consideration. Many people, especially those with relatively limited research experience,

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are embarrassed about their research ideas, and tend to feel that they are of no importance. This is an unfortunate attitude, since an idea, or part of it, may stimulate creation of a better idea, or provide the missing clue required for synthesis of something definite from a collection of disjointed "hunches". Even though research per se is not their job, regional personnel are invited, therefore, to communicate research ideas to the appropriate Division Chief involved at the Research Laboratories, or to the Director of Research with a copy to Director, Bureau of Operations. Nevertheless, before research ideas are transmitted to Research Laboratories, they must be thought out carefully, be more than just vague hunches and represent more than trivial details. For a variety of reasons, many research ideas originating either within or outside of Research Laboratories cannot be acted upon. Often the idea, though scientifically sound, may not be considered of sufficiently high priority, when considered in the light of all of the other requirements for research. Failure to have an idea accepted should not, therefore discourage the originator. From all that is known about the generation of ideas, it is apparent that the best way to have a good idea is to have a lot of ideas.

Research ideas also may originate from outside of the Directorate from hazardous side effects which appear after extensive clinical usage of a drug, for example. Often, these problems take the form of a crisis requiring immediate research activity. For instance, the 1965-66 episodes of cardiomyopathy in Quebec City beer drinkers stimulated a major research effort by the Pathology-Toxicology section of the Directorate. Because we need to be able to move quickly in a crisis situation, the Research Laboratories attempt to have a built-in flexibility in the research programs, - an ability to attack targets of opportunity - which will permit rapid reallocation of resources and personnel into a crisis area if the need arises. The breath of the current research program is shown in Volume II, Section 13.2.4.2.1.1.

(b) Preliminary Studies

Whatever their source, research ideas usually require a certain period of preliminary investigation before they can give rise to a formal research proposal. For this reason, research staff may carry out preliminary studies for 3 months in a field without formally submitting a research proposal. If at the end of this time, the idea still looks promising, a formal project outline must be prepared. This gives information on the need for the proposed research, its relationship to the needs and programs of the Directorate, the estimated cost and duration, and a brief outline of how the work will be carried out.

(c) Appraisal of Projects

The project must now run the gauntlet of critical examination by a research projects committee. This group is chaired by the Research Director and is composed of Research Laboratories' Division Chiefs plus representatives of the line-operating Bureaus of the Directorate. Senior staff advisers to the Directors-General also attend meetings of the committee on an ad hoc basis. The committee meets once every 3 months to examine new proposals for research projects. In January of each year a comprehensive review of all projects is carried out by the committee. On-going projects are evaluated for productivity and relevance to Directorate needs. The Directorate has now initiated a detailed review, in October, which is aimed at establishing research priorities. At this time, the research projects committee attempts to define the general areas where intra-mural research is indicated. This has been started to assure that available resources are being utilized most effectively. As a further aid to increased efficiency, Research Laboratories are beginning a management by objectives program, which will result in even closer control of resource allocation. In establishing research priorities, major emphasis is placed on carrying out work in the areas of the Directorate's responsibility

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which relate to protecting consumers against health hazards and fraud. A few more basic projects (approximately 8% of the total number of projects at present) may be conducted, but even these must eventually relate in some way to the Directorate's responsibilities. A good example of basic research with definite practical application to the Directorate's public health responsibilities is provided by work on the effects of irradiation on microorganisms. These important studies, carried out in the Microbiology Division of Research Laboratories, have provided invaluable basic knowledge while at the same time satisfying a need to know in a practical way, the effects of irradiation preservation on the microbial ecology of foods. Because the vast majority of research conducted by the staff of the Directorate is carried out by personnel of Research Laboratories the foregoing discussion relates primarily to them. Staff of the Bureau of Scientific Advisory Services, however, also conduct a limited amount of research. Their project proposals are prepared and evaluated by the Research Projects Committee in precisely the same way as those of Research Laboratories.

(d) System Used by Regional Laboratories

Requests to conduct investigative projects in the Regional Laboratories are handled in a somewhat different manner, largely because of the relatively limited research experience of Regional personnel, and the need for Regional Laboratories to concentrate on regulatory control work. If a Regional scientist wishes to conduct an investigative project, it is necessary for him to first get the approval of his Superintendent and Regional Director. If this is obtained, the project then is submitted to the Field Programs Division of the Bureau of Operations for clearance with respect to program priorities, and to Research Laboratories for clearance of the scientific aspects. A project leader is assigned from the Research Laboratories to guide the regional investigator and provide advice, encouragement and assistance as required. Of

necessity, investigative projects originating in Regional Laboratories cannot be of the same scope or complexity as those which originate in Research Laboratories. In general, projects originating in the Regions must be concerned with modifications of analytical methods. Regional analysts are encouraged to communicate directly with their research specialist counterpart in the Research Laboratories, when they have problems with analytical methods. Very often a phone call or letter will solve quickly, problems which otherwise would plague a regional analyst for several weeks or even months.

11.7.2.1.4 Cost Control

Records are kept of the man-years spent on each project for costing purposes. Attempts are being made to develop procedures which will permit accurate estimation of the cost-benefit ratios for the various projects. Although the research program always has been goal-oriented, as mentioned previously, a management by objectives program is being set up in Research Laboratories. Briefly, this will involve mutual agreement between the Research Director and his subordinate managers of research goals to be achieved during the next six months. The set of goals then will be used to evaluate managers' ability to keep their research growth in an agreed objective.

11.7.2.1.5 Research Contracts

Situations often arise which involve a need for research in specific areas which cannot be satisfied by Research Laboratories because of lack of staff, facilities, or previous commitments. Under such circumstances, perhaps the most efficient way to obtain the necessary technical information is to have it done on a contract basis. For that reason, a research contract system has been set up which permits the issuance of contracts to universities or other organizations to conduct specific research projects. It must be noted that the money provided under a research contract is not a general grant-in-aid; it is provided to obtain a specific answer to a specific problem. Current research contracts are as follows:

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<u>Project</u>	<u>Investigator</u>	<u>Funds Provided</u> <u>1968-69</u>
Drug metabolism in human volunteers in a prison setting	Dr. E.M. Boyd, Queen's University	15,000.
Effects of processing on Aldrin residues in tomatoes	Mr. G. Ross, Canadian Cannery Ltd.	12,000.
Long-acting depot steroids as anovulatory agents.	Dr. J. Campbell and Dr. G. Hurteau, Ottawa General Hospital.	8,000.

The management of research contracts is handled by a research contract committee consisting of the Director, Research Laboratories (Chairman); Directors, Bureaus of Operations, Drug Advisory Services and Food Advisory Services; Division Chiefs, Research Laboratories; and senior staff officers to the Director-General on an ad hoc basis. The committee determines areas where extramural research is required, establishes priorities, determines financial requirements, allocates available funds and evaluates interim and final reports from contractees. The planning cycle for research contracts is as follows:

January: (-15 months)	Research Divisions and Bureaus of Operations, Drug Advisory Services and Food Advisory Services indicate to Chairman of Research Committee, areas of importance where they feel research, both intramural and extramural, should be conducted. Research Contracts Committee assigns priorities to various areas where extramural research is indicated, and determines approximate financial requirements for research contracts, for inclusion in program review.
September: (-9 months)	Research Contracts Committee assigns final priorities and allocates money to various areas for next fiscal year, based on approved estimates.

October - January:
(-6 to -3 months) In conjunction with interested contractors,
committee members write research contracts.

February:
(-2 months) Contracts sent to qualified interested contractors.

March:
(-1 month) Contracts signed.

April: Contractor begins project.

Payment of research contracts is made only after receipt of proper interim and final reports.

It is planned to expand the research contract system substantially during the next 5 years. Provision of the necessary funds will permit maximum efficiency of utilization of Research Laboratories staff and equipment by eliminating the need for acquisition of equipment and development of expertise in areas where these already are available elsewhere in Canada.

Selected highlights from the research findings of the Research Laboratories are shown in Volume II of this Brief - Section 13.2.4.2.1.

11.7.2.2 Scientific and Technical Information

11.7.2.2.1 (a) The Advisory Bureaus

The two scientific advisory Bureaus, Food Advisory Services and Drug Advisory Services, were formed recently from the former Bureau of Scientific Advisory Services. As noted previously, their major tasks relate to evaluation of many facturers' submissions on new drugs, food additives, pesticides, cosmetics and medical devices. Extensive advice also is provided to manufacturers, other units of the Directorate and other governmental departments.

11.7.2.2.1.1 Drug Advisory Services

This Bureau contains the following Divisions: Medicine and Pharmacology, Veterinary Medicine, Manufacturing and Quality Control, Administration (including Submission Control). The Bureau has the following 1968-69 staff establishment:

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Administration and Submission Control	-	9
Medicine and Pharmacology	-	45
Veterinary Medicine	-	24
Manufacturing Control	-	<u>10</u>
Total		88

The 1968-69 Budget for the Bureau is as follows:

	<u>Salaries</u>	<u>A.O.&M.</u>	<u>Equipment</u>
Administration and Manu-			
facturing & Quality Control	\$187,350.	269,085.	2,000.
Medicine and Pharmacology	501,100.	577,800.	5,300.
Veterinary Medicine	273,780.	295,230.	6,000.

a) Management of New Drug Submissions

The way in which new drug submissions for human drugs are handled by the Divisions of the Bureau of Drug Advisory Services illustrates the work of the Bureau, attests to the high degree of judgment required by the scientific staff and indicates the care that is taken in making the necessary assessments. Submissions are received in duplicate. One copy is given to the Manufacturing and Quality Control Division, which examines the aspects of the submission related to manufacturing practices, sanitation, quality control, etc. The second is assigned to whichever of the 6 evaluation units of the Division of Medicine and Pharmacology which specializes in assessment of the class of drug involved. These units are integrated in nature, containing at least one physician and one scientist, to allow for a broad evaluation of any given product. The submission is then reviewed in detail by either a scientist or a physician, who writes a comprehensive summary of his conclusions. A second reviewer, who is a physician if the first reviewer was a scientist, and a scientist if the first reviewer was a physician, then conducts a second independent review of the submission. The second reviewer places special emphasis on examination of those aspects of the submission which are his specialty. Both reviewers then sign a summary report. Others may

be asked for advice on specific aspects of the submission.

After the review is complete, all those who have been involved, collectively make a recommendation regarding disposition of the submission. This is given to a Section Head, who has responsibility for three evaluation units. The Section Head coordinates the report on the medical and pharmacological aspects of the submission with that from the Manufacturing and Quality Control Division, and if the submission is considered incomplete, drafts a letter for the Bureau Director's signature, indicating such to the manufacturer. If the submission has been recommended for clearance, a Notice of Compliance, signed by the Director-General, is issued after label review.

b) Consultant Committees

Situations occasionally arise in which for various reasons the Bureau of Drug Advisory Services desires the advice of an outside group of experts before making a decision regarding a drug. On a number of occasions, expert committees have been assembled to advise the Bureau on such topics as (a) the relation between ulcerating stenosing lesions of the small bowel and ingestion of diuretics containing thiazides and potassium chloride, (b) the use of amine oxidase inhibitors, (c) drug sampling, (d) regulations on compulsory drug licenses, (e) drugs inducing ovulation. Although the membership of the committees necessarily varies according to subject, they are made up of authorities in the various medical and scientific disciplines involved.

c) Drug Adverse Reaction Reporting Program

This program, which is operated by the Bureau of Drug Advisory Services, has been set up to obtain information on unusual acute or chronic reactions to drugs, to advise physicians about adverse reactions, and to advise other Directorate units regarding warnings, contraindications, precautions and adverse effects to be included on drug labels. The program is outlined in detail in an article entitled "The Canadian Drug Adverse Reaction Reporting Programme" which appears in Volume II of this Brief, in Section 13.2.4.2.1.3.

d) The Canadian Poison Control Program

The Food and Drug Directorate has been concerned for many years by reports of accidental poisonings caused by drugs and household chemicals. Several years ago, the need was recognized for a system whereby information on all products which could result in poisonings would be immediately available to physicians confronted with an emergency.

The establishment of the first Poison Control Centres in the United States in 1953 kindled the interest of physicians, hospital groups and professional societies in Canada. In a few of the university centres committees of physicians were convened to study the mechanics of setting up a national Poison Control program. The Food and Drug Directorate agreed to provide the nucleus of an information system on poisonings and to supply data to the provincial departments of health for distribution to parties interested in developing a Poison Control Centre. The choice of suitable locations for the Centres became the responsibility of each province.

From its inception in the Spring of 1957, the Poison Control Program has grown to encompass 258 Centres across the nation.

The amount of information available on products which are poisonous or potentially poisonous has increased dramatically and this is largely because of the willing cooperation of various manufacturers and associations. Those associations which have been most helpful in providing material to the Directorate include the following:

- Canadian Manufacturers of Chemical Specialties Association
- Canadian Agricultural Chemicals Association
- Canadian Paint Manufacturers Association
- Canadian Chemical Producers Association
- Toilet Goods Manufacturers Association
- Society of the Plastics Industry (Canada) Ltd.
- Proprietary Association of Canada
- Pharmaceutical Manufacturers Association of Canada

At present, the number of Poison Control Information Cards available either in the local Centres or in the Directorate's files exceeds 10,000.

The second role of the Food and Drug Directorate in the Poison Control Program is to gather the details of cases of poisoning reported from the Centres for the purpose of periodic reports on poisonings, to be fed back to each Centre, and for the information of other interested parties. A poison report form, which is made available for this purpose, is used by many of the Centres across the country. Details on the age and sex of the patient; the name and amount of the product ingested; the interval between ingestion and treatment; the type of treatment employed; medical complications, if any; and a follow-up on the health of the patient, are requested on this form.

Program

The workload of the Bureau of Drug Advisory Services is summarized below.

	Number Received 1967	Number Cleared 1967
<u>Human Drugs</u>		
New Drug Submissions	54	30
Supplementary New Drug Submissions	111	92
Preclinical New Drug Submissions	126	77
<u>Veterinary Drugs</u>		
New Drug Submissions	37	11
Supplementary New Drug Submissions	18	5
Preclinical New Drug Submissions	21	7

11.7.2.2.1.2 Food Advisory Services

This Bureau consists of three units: The Division of Toxicology, The Division of Standards and Additives, and the office of International Standards. The Toxicology Division is primarily concerned with assessment of data on the toxicology of foods, food additives and pesticides, but also provides advice on other toxicologic matters. The Standards and Additives Division coordinates and reviews submissions of technical data and provides scientific advice on food standards, food additives, pesticides, cosmetics, packaging materials, sanitizers

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and medical devices, while the Office of International Standards deals with international agencies in setting up standards for foods. The present staff of the Bureau is as follows:

	<u>Professional</u>	<u>Support</u>
Standards and Food Additives	11	5
Toxicology	7	5
Office of International Standards	1	-

The Budget of the Bureau is \$293,600. for 1968-69.

In many ways, the work of this Bureau parallels that of the Bureau of Drug Advisory Services described above, and requires the same high degree of scientific competence and judgment. Submissions are examined in detail by units of specialists in a given area. In the Standard and Additives Division, for example, a submission is scrutinized in depth by staff of one or more of four units - cosmetics, pesticides, food additives or packaging. The same general procedures are followed as in the Bureau of Drug Advisory Services. 13.2.4.2.1.4 illustrates the completeness and complexity of the information required of manufacturers for pesticides, (See Volume II).

Program

The workload in the Bureau is summarized below.

<u>Division</u>	<u>Submissions or Enquiries Reviewed - 1967</u>
<u>Toxicology</u>	
Food additives	60
Pesticides	53
Cosmetics	5
Miscellaneous	18
<u>Standards and Additives</u>	
Cosmetics	34
Devices	16
Food Additives	234
Foods, general	68
Methodology	140

Miscellaneous	133
Packaging materials	118
Pesticides	184
Reference standards	99
Sanitising agents	185
Surface coverings	60

11.7.2.2.2 Information Retrieval Centre

The Food and Drug Directorate operates an Information Retrieval Centre responsible for:

- (1) The storage and retrieval of all documents concerning rulings and decisions on foods and drugs.
- (2) Abstracting, classifying, coding and filming of all human and veterinary preclinical and clinical New Drug Submissions; Pesticide and Food Additive, Cosmetic and Medical Device Submissions.
- (3) Classifying, coding and filming of Drug Notification Forms.
- (4) Providing versatile retrieval of information from the above-mentioned input sources. Compiling reports, surveys and providing copies of actual documents, drug notification forms, and submission data upon request.
- (5) Preparing literature reviews and bibliographic citations for research projects and submission reviews.

Information can be retrieved from approximately 2500 New Drug Submissions and 26,000 Drug Notification Forms. Approximately 82,000 "ruling and decision" documents have been indexed to date and also are available for retrieval purposes. The number of "ruling and decision" documents is increasing by approximately 2500 per month. Detailed information on information retrieval activities of the centre is given in an article by A.B. Tennenhouse and M. Skulski, entitled "Information Retrieval Activities at the Food and Drug Directorate". Copies may be obtained on request from the Food and Drug Directorate, Tunney's Pasture, Ottawa.

11.7.2.2.3 Drug Notification Program

The drug notification program is designed to establish and maintain an up-to-date record of drug manufacturers who market or import drugs in dosage form for sale in Canada, along with information on the names under which the drug is sold, the use or purpose for which it is recommended, a quantitative list of its medical ingredients, and the recommended dosage. Acquisition of this information identifies and locates the manufacturer for plant inspection purposes and provides basic information on the drugs he sells. Division 9 of the Food and Drug Regulations provide that a drug manufacturer must file an official form for each of his drug products. For each additional product introduced after October 1, 1966, the form must be filed within 30 days after initial marketing. If a drug is discontinued, the Director-General must be so informed. A change in the formulation of a drug or in its recommended dosage or use also requires a new Notification within 30 days of such a change.

Before 1 October each year, each manufacturer must send a list on an official form of the products he is marketing at the time. Drugs in dosage form imported for sale in Canada, require a Notification by the foreign manufacturer or his Canadian representative. Upon receipt by the Directorate, the Notification form goes to the Scientific Information Retrieval Section where it is numbered and microfilmed. Staff of the Bureau of Operations then examine the form for completeness of the mandatory information, the label is reviewed and violations are brought to the manufacturer's attention. The information on corrected and completed forms then is coded under a variety of headings which will permit quick retrieval of such information. So far over 25,000 Notifications have been received from more than 900 manufacturers.

11.7.2.2.4 Technical Information Unit of Research Laboratories

The Research Laboratories operate a small technical information unit which provides information on the analysis of foods, drugs,

pesticide residues, vitamins, food additives and narcotics to the Directorate's Regional laboratories, other governmental departments and industry, both national and international. This unit also provides chemical standards and information on these standards to Regional laboratories, industry and universities.

11.7.2.3

Scientific Data Collection

Although Research Laboratories and the two advisory Bureaus necessarily collect considerable amounts of scientific data, most of those used as statistics for operating purposes are obtained by the five Regional laboratories of the Bureau of Operations. The Regional laboratories carry out surveys to monitor foods, drugs and cosmetics on the national market. Both domestic and imported sources are sampled, the latter usually at the ports of entry into the country. In the two larger Regional laboratories, Toronto and Montreal, the laboratories are divided into the following specialty areas, each of which is headed by a senior experienced analyst: foods, drugs, pesticides, vitamins, microbiology. The three smaller Regional laboratories (Halifax, Winnipeg, Vancouver) have the same general organizational set-up except that the vitamin section is omitted. In all of the laboratories, junior staff are moved among the various work areas depending upon the work load.

Analytical data obtained in the Regional laboratories are used in support of inspection activities and often form the basis for enforcement action. After they have served this immediate purpose, the data are sent to Headquarters where they are coded for input into S.D.P. The total amount of analytical information obtained thus can be evaluated to detect problems and trends on an industry or national basis. The data play an extremely important role in the formation of new standards, establishment of criteria for good manufacturing practice, and other enforcement action.

11.7.2.4 Training of Scientific Manpower

Because of staff expansions and rapid technological change, it is necessary to train and retrain staff on a continuing basis. For several years, the Directorate has had an educational leave program, whereby professional staff at the sub-doctorate level can be sent at half-pay to an institution approved by the Directorate, for additional formal training leading to a doctorate. This program has been expanded recently because of the critical need to train additional pharmacologists who are in short supply at the doctorate level. Many staff members also take occasional courses at local universities or technical institutes to improve their job capabilities. In addition, there is increasing need for re-training of staff due to rapid expansion of scientific knowledge. This is being accomplished in the following ways: attendance at scientific meetings; sponsorship of seminars, workshops and symposia; transfer of selected scientists to a university setting for 3 - 12 months, to permit them to take courses, consult with other scholars and generally rejuvenate their scientific and creative energies; limited involvement of personnel with university teaching including supervision of graduate students. The latter procedure has been found particularly effective in assisting senior staff to keep up to date. Details are given below.

	<u>1967-68</u>	<u>1968-69</u>
(i) <u>External Training</u>		
Personnel on Ph.D. training	5	7
Personnel on transfer of work to university	1	4

Periodic workshops are held which permit analysts from the Regional laboratories to obtain the most recent information available on new techniques and procedures from the staff of Research Laboratories. During the past year, workshops of two weeks duration were held on pesticide analysis and drug analysis.

11.7.3 Co-ordinating Mechanisms

The staff of the Directorate collaborate actively with a large number of other agencies and organizations. Although it would be extremely difficult to list all such contacts, examples of the major ones are given below. A complete list of committees with which Research Laboratories personnel were involved during 1967 is shown for purposes of illustration in Vol. II - 13.24.2.1.5.

1. Learned and Professional Societies

A number of staff members serve on the executive bodies of national and international societies. For example, in the field of nutrition alone, scientists from the Directorate have served during the past years as President and Treasurer respectively of the Nutrition Society of Canada, and served also on the Nutrition Committee of the Pediatrics Society of Canada.

2. Universities

Five staff members were involved with part-time university teaching during the past year, while numerous others gave invited lectures to graduate or undergraduate students.

3. Other Departments of the Federal Government

Staff members served on interdepartmental committees of various sorts.

4. International Agencies

Close contact was maintained with agencies of WHO, FAO and UNICEF. A UNICEF Fellowship has been established for several years in the Nutrition Research Division of Research Laboratories, to provide advanced training in protein nutrition and biochemistry for selected scientists from developing countries. Several staff members acted as consultants to or members of WHO or FAO Expert Panels or Committees.

5. Departments of Foreign Governments

The Director of Research Laboratories served on the advisory group on clinical trials of the Taskforce on Medicare of the U.S. Department of Health, Education and Welfare. This group is concerned with the physiological equivalency of brand-name and generic drugs.

6. Other Contacts

Close contact was maintained with the U.S. Pharmacopeia and other pharmaceutical standards groups. For example, the Director of Research Laboratories served on the joint committee of the USP and the National Formulary which is considering availability to the body of drugs in various dosage forms, and the Chief of the Pharmaceutical Chemistry Division served on the quality control commission of the International Pharmaceutical Federation.

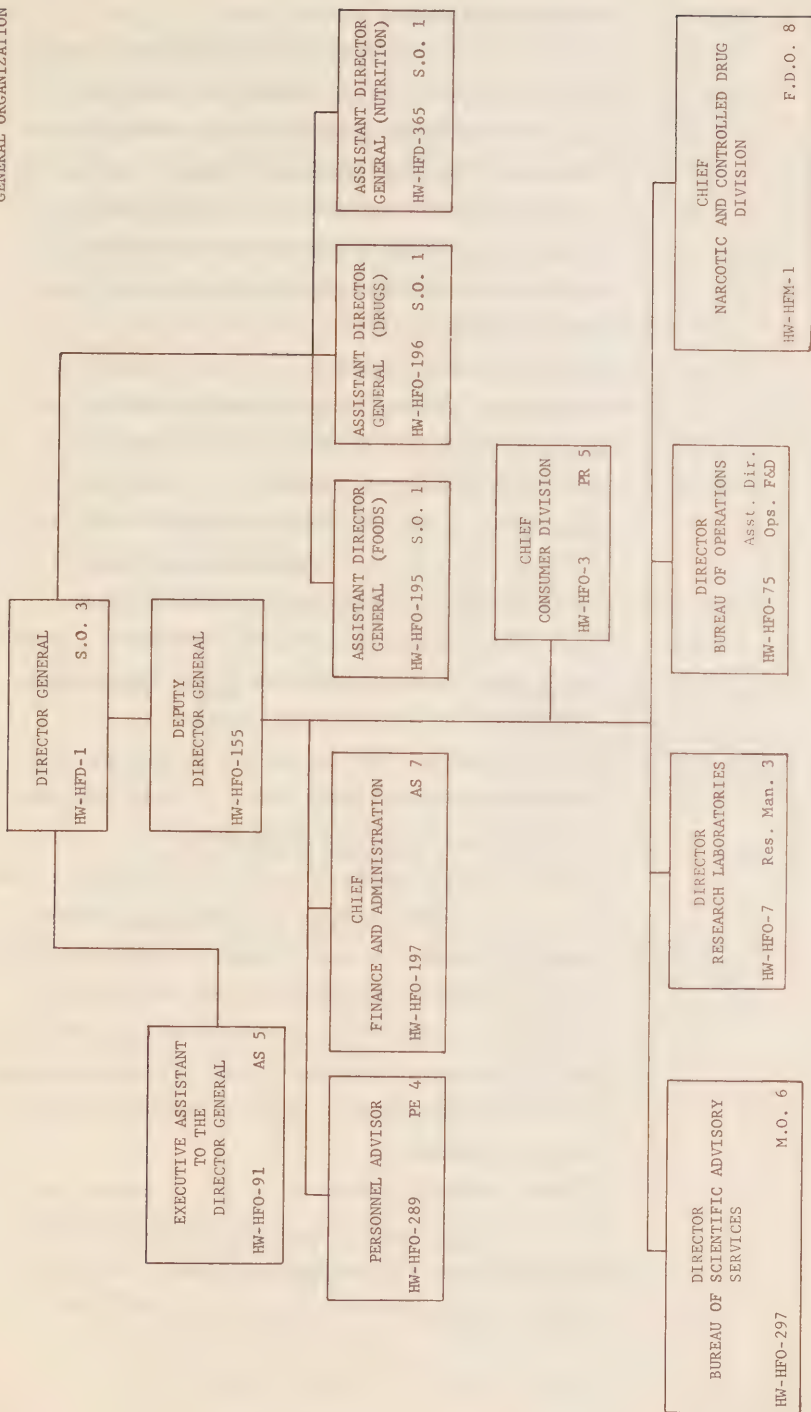
A number of staff members serve on the editorial boards of scientific journals. The staff of Research Laboratories alone received over 40 invitations to give lectures on various topics to scientific bodies.

Close contact is maintained with the Association of Official Analytical Chemists (AOAC). Five staff members served as referees or associate referees of various AOAC committees.

NATIONAL HEALTH AND WELFARE
FOOD AND DRUG DIRECTORATE
GENERAL ORGANIZATION

Science Policy

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11.8

INCOME SECURITY BRANCH

The Income Security Branch consists of two divisions administered by a Director General. These are the Canada Pension Plan and the Family Allowances and Old Age Security Division. The Director of the Old Age Security Division is assisted by an Assistant Director of Operations who has responsibility for the daily operation of regional officers, financial planning, programme and budgeting, personnel and general organization and management.

The Chief of Policy Programme and Planning is responsible for developing programme policy and general procedural outlines for new programmes or extension of programmes within the division as well as evaluation of the effectiveness of programmes for operational purposes in relation to the objectives. Thus, some portion of the duties may be described as operational research. There are ten regional directors, mainly drawn from the fields of public administration, social work or education who are responsible for the administration of five income security programmes, namely,

11.8.1

- 1) Family Allowances, under the Act of 1944, provides under the Consolidated Revenue Fund allowances to every child under 16 born in Canada or resident for one year,
- 2) Under the Family Assistance Program, allowances are provided for each child under 16 resident in Canada, supported by an immigrant or Canadian returned to Canada to reside permanently.
- 3) Youth Allowances, under the Act of 1964 are payable to youths 16 and 17 years in full time educational programs, or physically or mentally impaired. (Youths in Quebec are covered under a provincial program for which the province is compensated by tax abatement.)
- 4) Under the Old Age Security Act of 1951, as amended, the federal government pays a monthly pension to eligible elderly persons. Prior to 1966 the eligible age was 70 years, but this age is being gradually lowered to 65 by 1970. The

program is financed through special revenues paid into a fund known as the Old Age Security Fund.

5) The Guaranteed Income Supplement, by an amendment to the Old Age Security Act, approved December, 1966, provides the supplementary income to insure a guaranteed annual income of \$1,260 for a single pensioner and \$2,520 for a two-pension married couple. The G.I.S. is administered in conjunction with the Old Age Security pension program, with applications for the supplement sent to each person when he begins to receive the old age security and subsequently at the beginning of each calendar year. Entitlement is reassessed each year on the basis of the pensioner's income the previous year. The activities of the division are mainly administrative. Research relating to these programs is carried out by the Social Security Division of the Research and Statistics Directorate.

11.8.1.2

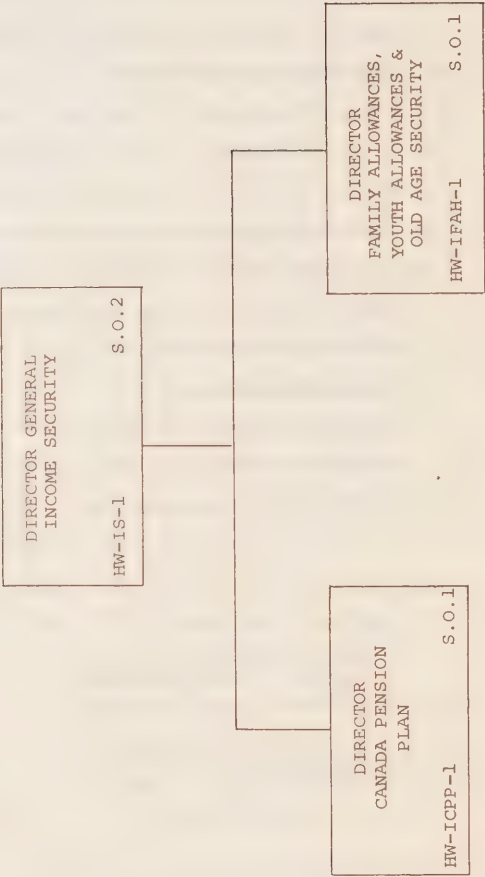
Coordinating Mechanisms

In carrying out their responsibilities, officers of the Division work cooperatively with the following bodies:

Officials of other Departments or Agencies	Manpower and Immigration Dominion Bureau of Statistics Department of Justice Comptroller of the Treasury Department of National Defence Royal Canadian Mounted Police Department of Veterans' Affairs
Officials of industry, business or other organizations	Officials of private welfare agencies *
Officials of other levels of government	Officials of provincial and municipal welfare departments Provincial agencies dealing with estates, e.g., Public Trustee
Officials of other countries	Officials of countries with which Canada has reciprocal agreements in welfare matters.

* there is some contact with private business concerns such as insurance companies who advertise in such a manner that allowances be used in certain ways and with retain stores who run lotteries related to the cashing of allowance cheques at their establishments.

NATIONAL HEALTH AND WELFARE
INCOME SECURITY BRANCH - 1
GENERAL ORGANIZATION



11.8.2

The Canada Pension Plan

Organization and Responsibilities.

The administration of the Canada Pension Plan, Canada's major social insurance program is divided among a number of federal government departments. The C. P. P. provides for contributors and their dependents, protection against the contingencies of retirement from the labour force, severe and prolonged disability and death. The Department of National Health and Welfare is responsible for the administration of the Act other than part I, concerned with coverage and collection of contributions, coming under the jurisdiction of the Department of National Revenue. The Department of Finance is responsible for the C. P. P. Account and Canada Pension Plan Investment Fund. The U. I. C. is responsible for assigning social insurance numbers to contributors. The C. P. P. administration is organized into three divisions: Benefits, Field Services and Accounting and Control, as well as an office of Planning and Development and an Office of General Administration. There are 131 district and local offices offering an unprecedented opportunity for communication between the federal government and the people of Canada. Services provided by district offices include the receiving of applications, dissemination of information and counselling of applicants. Close coordination is maintained between the district offices in each province and the regional offices of Old Age Security. Close consultation and coordination has also been initiated with Quebec Pension Plan Officers and Q. P. P. Board. The Office of Planning and Development has responsibility for initiating, directing and coordinating operational research to ascertain the effectiveness of the Plan in attaining its objectives and recommend improvements.

11.8.2.1

Data Collection

The Office of the Comptroller of the Treasury has, on a temporary basis, provided assistance to this Department in the planning, acquiring and installing of an Electronic Data Processing Unit and in the operation of that Unit during the initial stage. The Department of Insurance has been responsible for preparing actuarial reports in the program. Current plans provide for the transfer of the E. D. P. Unit to this department and for the Department to assume the pre-audit functions now carried out by the Office of the Comptroller of the Treasury. (See Research and Statistics for additional information under this heading.)

11.8.2.2

Interdepartmental Coordination

An interdepartmental coordinating committee was established in 1966 to include representatives of all participating departments under the chairmanship of the Director of the Canada Pension Plan Administration of this Department. This Committee acts under the approval of the five ministers responsible. A separate, pre-existing Coordinating Committee on Coverage has not been disbanded and is still in operation. Prior to the passage of the Act, in the planning phase, an Interdepartmental Committee on Canada Pension Plan Statistics was established.

11.9

WELFARE ASSISTANCE AND SERVICES BRANCH

Organization and Responsibilities

Welfare Assistance and Services is a program directorate within the Department of National Health and Welfare. It is headed by a Director-General whose staff includes a Special Assistant and two Specialist Consultants. The major responsibility of the Branch is to support the operation and development of welfare assistance and services programs in Canada through the provision of federal funds and technical advice. This is done through two divisions, the Canada Assistance Plan and National Welfare Grants, each headed by a Director.

11.9.1

Canada Assistance Plan

The main function of this division is the administration of the Canada Assistance Plan, a federal statute¹ authorizing agreements with the provinces which provide for federal support of the integration, broadening and improvement of provincial and municipal public assistance programs and the extension and development of welfare services. Under these agreements in force with all provinces, the federal government reimburses them 50 per cent of shareable expenditures, which may be incurred not only by the province but also by municipalities and non-governmental agencies in accordance with the provincial laws. The Division also administers four predecessor statutes. These provide for federal sharing in the costs of provincial assistance programs to needy aged, blind, disabled and unemployed. These programs are being "phased out" at the option of the provinces through absorption into comprehensive provincial schemes which provide assistance irrespective of the cause of need. This is in accordance with the intent of the Plan.

11.9.1.1

The plan provides for:

- financial assistance to persons in need. Eligibility for assistance is determined on the basis of a needs-test that takes into account the budgetary requirements of

¹ The Canada Assistance Plan Act was given royal assent in July, 1966 and the first federal regulations were approved by the Governor-in-Council in January, 1967.

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recipients for items such as food, shelter and clothing as well as their income and other resources. The groups covered include needy mothers, the aged, the sick and disabled, and unemployed persons;

- care for persons in need who are in welfare institutions, such as homes for the aged, nursing homes and hostels;
- care of children under the age of twenty-one years, including their maintenance in foster homes and in child care institutions including those for the emotionally disturbed and the retarded;
- health care services for persons in need, including medical services, dental and optical care, nursing care and drugs;
- costs of extending and improving welfare services.

The services covered include rehabilitation services, case work, counselling and referral services, homemaker and day care services, community development, and the cost of administering assistance programs. The major costs covered are expenditures in excess of those included during the fiscal year 1964-65 for salaries, fringe benefits, travel, staff training and fees for consultation and research. The agencies covered are provincial and municipal departments of welfare and voluntary agencies approved by the provinces.

11.9.1.2

Agreements with Provinces

All provinces have signed agreements under Part I relating to general assistance and welfare services (with effect retroactive to April 1, 1966).

Federal-Provincial agreements are authorized under Part II of the Plan to provide for the extension of provincial welfare programs to Indians living on reserves or in unorganized territory, with provision made for a higher rate of federal contribution. Final agreements have not yet been signed under Part II.

Provision is made in Part III of the Plan for special work activity projects designed to help improve the motivation and work capacity

of persons who have not been able to take full advantage of training opportunities, or who have unusual difficulty in securing or retaining employment. Agreements had been signed with four provinces by the end of September 1968 and a number of projects were under consideration.

11.9.1.3

Operational Research and Community Development

While agreements under Part I of the Canada Assistance Plan do not provide for projects or earmarked federal grants for specific purposes, provincial reimbursement claims are met providing these apply to approved types of costs. Among these are consulting, research and evaluation services with respect to welfare programs and payment for research or consultation carried out on a contract or fee-for-service basis. Statistics on expenditure for these specific purposes are not available. Welfare services are commonly regarded as applying to individuals or families. However, the Canada Assistance Plan, recognizing that the causes and effects of poverty and dependency need to be dealt with on a broader scale, provides for the sharing not only of standard welfare services such as case work, adoption, home-maker and day care services, but also community development services, defined as services designed to encourage and assist residents of a community to participate in improving the social and economic conditions of that community by reducing the causes and effects of poverty, child neglect and dependence upon public assistance. The cost of community development services under welfare auspices are shareable with the provinces under Part I of the Canada Assistance Plan agreements. Advice is provided on request to provinces and to other federal agencies administering community development programs about the application of this provision to community development programs. Agreements under Part II of the Canada Assistance Plan, relating to the extension of provincial assistance and welfare services programs to Indians with reserve status, now being negotiated, have an important potential for regional development.

11.9.1.4

Operating Statistics

The Canada Assistance Plan requires that every agreement relating to general assistance and welfare services provide for the exchange between Canada and the Provinces of statistical and other information relating to the operation of the Plan and corresponding provincial laws. Agreement on a set of basic statistics has been reached and the provinces are in the process of putting them into use. Despite a number of difficulties encountered by the provinces, including staff shortages and problems of computerization, a great deal of progress is being made in developing the statistical data. When the reporting system comes into full operation comprehensive data will be available for all provinces for the first time on the major reasons for assistance, type of benefit allowance for each family or single person unit, size of unit assisted and characteristics of recipients including age, sex and employment category.

It is estimated that at December 1967 slightly more than a million persons were receiving benefits under the Canada Assistance Plan. Federal payments to nine provinces under Part I agreements for the 1967-68 fiscal year totalled over \$240,000,000. The province of Quebec, operating under the contracting out provisions of the Plan received its compensation in the form of tax abatements and equalization and adjustment payments under the Established Programs (Interim Arrangements Act). The total federal expenditure resulting was of the order of \$340,000,000.

11.9.1.5

Technical Information Activities

Officers of the Division are sent as designated representatives and invited to be speakers, discussion leaders and resource persons at international, national, regional and local conferences and seminars dealing with welfare and related matters. Because the Canada Assistance Plan is supporting extensive modifications in provincial welfare programs the Director and administrative staff provide continuous advice and information to provincial officials. While this mainly concerns the application of the federal statute to provincial programs, federal consultants also provide assistance

and advice to the provinces in relation to specific programs such as residential welfare institutions, welfare services and public assistance standards. Such help is provided through correspondence, field visits, special meetings and conferences. A departmental publication entitled "Notes on Welfare Services" prepared by the Canada Assistance Plan Division, has been issued for the use of provincial officials in interpreting references in the federal legislation to welfare services. A similar publication relating to welfare assistance is in preparation.

11.9.1.6

Training and Retraining of Welfare Manpower

Since the Canada Assistance Plan is designed to help develop and improve welfare programs within the provinces, the federal statute provides specifically for the sharing of costs of staff training relating to the provision of both welfare services and assistance. Shareable costs include payment of travelling expenses, registration fees for conferences and seminars, payments to instructors and training institutions for the training of welfare services staff and living allowances to such staff while receiving training. Statistics on specific expenditures for these purposes are not yet available. Officers of the Division are occasional guest lecturers at university Social Work and Welfare courses. On request, the Division participates in the arrangement of programs within the Department for students and welfare officials visiting Ottawa from elsewhere in Canada and other countries. Several divisional staff members are engaged in approved part-time studies at Carleton University relating to their duties.

11.9.1.7

Coordinating Mechanisms in Policy Formulation

Since the Canada Assistance Plan operates in an area for which the provinces have primary responsibility, its development has been marked by close and continuous consultation between the governments concerned. These have taken place at several levels - ministerial, deputy ministerial and official. Permanent machinery for consultation is being developed through which the Canada Assistance Plan

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administration can systematically stimulate study and discussion between provincial officials concerned with specific program areas such as public assistance and institutional care. Close working relationships are maintained with officials of the Department of Indian Affairs and Northern Development and Manpower and Immigration respectively, in relation to the development of policy and agreements under Parts II and III of the Canada Assistance Plan. The Division is represented on the Interdepartmental Committee on Socio-Economic Research, where it is especially concerned with research relating to income maintenance programs. It is apparent that much of the potential of the Canada Assistance Plan has yet to be realized and that proper evaluation is not possible at this time. The administration is still concerned with establishing a system of basic statistics which will show the number and kinds of people being assisted under related provincial programs and the costs of such assistance. Nevertheless it is expected that federal-provincial collaboration through the Plan will eventually produce a broad range of data which will assist materially in interpreting and developing the role of public assistance as an instrument of government policy. Since public assistance is the last line of defence against destitution, it has to cope with the consequences, not only of individual inadequacy, but also of the defects in our social and economic system which produce insufficient opportunities for self-support. Objective studies to determine how and why people become dependent upon public assistance, why they remain so and how they escape from it are essential parts of any design to reduce such dependency to a practical minimum.

11.9.2 National Welfare Grants Division11.9.2.1 Introduction

The National Welfare Grants program was inaugurated by the federal government in 1962 to help resolve three problems, the continuing presence of which seriously affects the development of an efficient and effective welfare system: the critical shortage of appropriately trained social welfare manpower; the almost complete absence of applied research in the welfare sector; the paucity of demonstration and experimentation in welfare administration and in welfare services.

The general objective of the program is to assist in the development and strengthening of Welfare Services in Canada. Its basic authority is an annually renewed Order-in-Council.

11.9.2.2 Research Policies and Administration Procedures

Under the research provision grants are made available to provincial and municipal departments, national, provincial and local voluntary welfare agencies and organizations, schools of social work and research institutions for projects submitted and approved in accordance with the terms of annual Welfare Grants Rules.

Projects may include research design submissions, social surveys with special reference to welfare needs and resources, or experiments to test hypotheses. Applications are appraised by officers of the Division with subject matter expertise as well as by research officers of the Research and Statistics Directorate in relation to methodology, other interested federal officers in this and other Departments and, as required, by members of a Research Project Assessment Panel. They are then referred to a Research Advisory Committee which make recommendations to the Minister who authorizes awards. Priority is given to projects holding promise of producing new knowledge of specific interest to the welfare

For appraisal of the status of welfare research in Canada, see: Freda L. Paltiel "Welfare Research in Canada", Canadian Welfare, 42:5, Sept. - Oct., 1966.

Poverty: An annotated Bibliography and References, Part B, "Inventory of Research and Action Programs", Canadian Welfare Council, 1966. D.N.H.&W., Res. & Stat. Div., Inventory of Welfare Research, Nov. 1967.

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constituency and capable of application to welfare services and to projects which advance the methodology of social research applied to welfare problems or services.

Under the terms of the Welfare Grants program, financial commitments can be made for one fiscal year at a time. However, priority is given to applications for continuing assistance, conditional upon a satisfactory progress report.

11.9.2.3

Research Expenditures

In recognition of the growing importance of research the proportion of the total National Welfare Grants allocation for this purpose was increased in 1967-68 from 10 to 15%. (As a result, \$328,314 was expended on 43 projects, against a total of approximately \$448,000 on 62 projects during the previous 5-year period.)

An increasing proportion (30% in 1967-68) of research awards is going to University departments including schools of social work and University-based institutions.

11.9.2.4

Mental Retardation Grant

In 1967 the federal government introduced an additional program of grants to support research and demonstration activities relating to mental retardation. The Mental Retardation Grant is \$500,000 each year for five years. Of this amount \$300,000 was made available in 1967-68 for welfare research and demonstration activities. Eleven grants for four research and five demonstration projects were awarded for a total expenditure of \$163,000. This grant does not require matching funds. See 11.4.10 describing provisions for health research and demonstration under the mental retardation Grant.

11.9.2.5

Consultant Services

The officers of the National Welfare Grants division are in constant and heavy demand by welfare departments and private agencies for consultant services in relation to the development, planning and execution of projects, especially in the areas of manpower and research, each of which has a Principal Grants Officer assigned to it. Officers of the division are sent as designated departmental

representatives and also invited to be speakers, discussion leaders and resource persons at international, national, regional and local conferences and seminars dealing particularly with welfare manpower and research.

As is feasible, the division prepares for publication, lists of various kinds of projects assisted for the information of interested governments, voluntary agencies and universities. Receipt of a report on completion is a condition of every research grant made. Limited staff resources have made it impossible to evaluate these reports, which should be done as part of an appraisal of the entire program.

11.9.2.6

Training and Retraining of Welfare Manpower

Until the inception of the Canada Assistance Plan, the National Welfare Grants program was the only source of federal funds for the training of welfare personnel. Under the welfare service plans submitted by the provinces, federal help can be given on a matching basis for bursaries and training grants. The former are for graduate studies in Canadian schools of social work by persons committed to subsequent employment approved by the sponsoring provincial department, the latter for the same kind of training by persons already employed, where the costs are not shareable under the Canada Assistance Plan. Staff development grants have also been available for a broad range of in-service training under the same conditions.

The directly administered scholarship provision of the Welfare Grants program offers 40 scholarships annually on a national competitive basis and is designed to attract high calibre university graduates to professional training in social work. They are awarded on the basis of high academic achievement and are tenable at any graduate school of social work in Canada. Twenty fellowships are offered annually for advanced study in social work or related social sciences at universities in Canada and elsewhere as a means of developing administrative, research and teaching leadership potential for Canadian welfare. The

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teaching and field instruction provision is designed to strengthen and extend the faculties of Canadian schools of social work and to assist in the planning and organization of new schools. National voluntary agencies have made extensive use of project funds for staff development purposes. Of the 20 awards made to such agencies in 1967-68, 15 supported projects designed to upgrade the knowledge and skills of direct service personnel, administrators, planners and key volunteers, or to assist in resolving problems facing social work education. These seminars, workshops and staff institutes are encouraging the development of Canadian resources for welfare leadership and providing a forum for representatives of public and voluntary welfare agencies.

11.9.2.7

Coordinating Mechanisms

The National Welfare Grants program has developed several special advisory mechanisms. A Research Advisory Committee, composed of non-departmental research experts, meets three times a year to review research projects submitted and recommend on their disposal. The Committee may also make recommendations on policy matters. Members of a Research Project Assessment Panel, composed of non-governmental experts, are used selectively to appraise individual research proposals in their particular area of competence. The Panel is a source of recruitment for the Research Advisory Committee, whose members are appointed for three years by the Minister. A National Selection Committee, similarly appointed by the Minister and consisting of non-governmental experts in the field of welfare education and employment, meets twice annually to review scholarship and fellowship applications and to advise on awards. They may also advise on policy in relation to the manpower concerns of the National Welfare Grants program. The Research and Statistics Directorate, in addition to appraising all research applications, is represented at meetings of the Research Advisory Committee.

Officers of the Division are involved, either through standing arrangements or on an AD HOC basis in the policy-making and coordinating activities of a variety of international, national

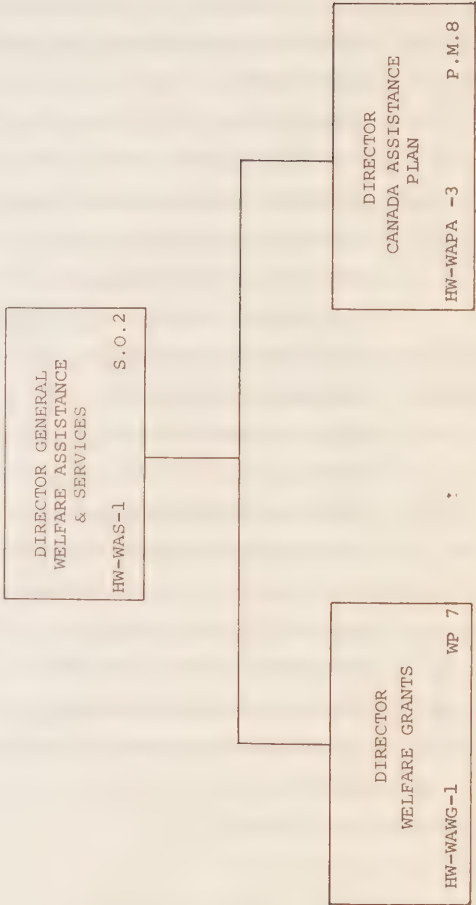
regional and local bodies whose functions are directly related to the purpose of the National Welfare Grants program. Among the more important of these are the Council on Social Work Education, which is the official accrediting body in this field for North America, the Canadian Welfare Council, the Institute for Social Science Research, the Canadian Association for Retarded Children and the Canadian Association for Education in Social Services. The Division also is, or has been involved in departmental coordinating committees concerned with such matters as family welfare and mental retardation, inter-departmental committees on Indian welfare programs, public assistance, juvenile delinquency, socio-economic research and community development and federal-provincial committees on welfare statistics and Indian affairs.

11.9.2.8

Operating Statistics

Under the pressure of a rapidly evolving program, the Division, chronically under-staffed, has produced only minimal operating statistics, such as numbers, sources and purposes of applications received, decisions made, expenditures approved and paid. Since it operates on a project basis, the program requires detailed records of the individual project to ensure uniformity with the approved pattern of expenditure. Steps are underway to develop a financial reporting system which will be programmed to provide data necessary for program review, evaluation and planning.

NATIONAL HEALTH AND WELFARE
WELFARE ASSISTANCE AND SERVICES BRANCH
GENERAL ORGANIZATION



11.10

SPECIAL PROGRAMMES BRANCH

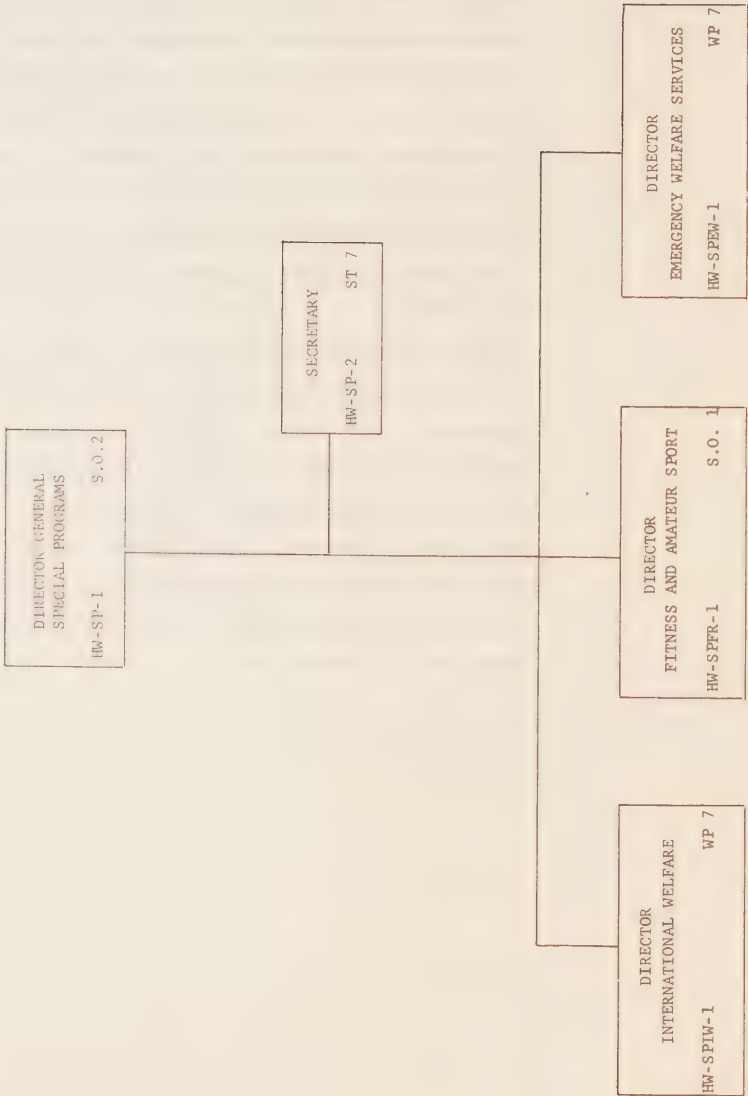
The Special Programmes Branch is composed of three Directorates, International Welfare, Emergency Welfare and Fitness and Amateur Sport.

Through the first, Canada's work with the United Nations, including representation on the Commission for Social Development, the Executive Board of UNICEF and other international agencies is carried on, work on reciprocal arrangements in social security is coordinated, assistance is given to external aid programs, and other activities related to liaison in welfare matters and to social development in other countries are carried out as well as the international aspects of Emergency Welfare and Fitness and Amateur Sport.

Through the Emergency Welfare Directorate, a system of preparedness for the welfare aspects of nuclear and natural disasters is maintained.

Through the Fitness and Amateur Sport Program, assistance is given to the promotion and development of amateur sport and related recreational activity at all levels from the community to international games, through assistance for competition and training, research, professional instruction, promotional and instrumental services and aids.

NATIONAL HEALTH AND WELFARE
SPECIAL PROGRAMS BRANCH - 1
GENERAL ORGANIZATION



11.10.1 Emergency Welfare Services11.10.1.1 Responsibility and Organization

The Emergency Welfare Services (EWS) Division has the following responsibilities as established by Order in Council (P.C. 1965-1041):

"Be responsible, through an Emergency Welfare Services organization, for

- (a) assistance to provincial and municipal governments in the operation of emergency welfare services consisting of emergency feeding, clothing, lodging, registration and inquiry and personal services, including
 - (i) the control and allocation of federal welfare material and assigned personnel resources, and
 - (ii) in consultation with other departments, advice, on priority use of essential survival resources, both material and personnel, available throughout the country;
- (b) operating emergency welfare services within a province or provinces where adequate services are not being provided, including the priority requisitioning of accommodation for emergency lodging purposes during the immediate survival phase following a nuclear attack; and
- (c) co-ordinating welfare mutual support action between the provinces and between Canada and the United States of America."

The Division consists of a Director, Deputy Director, Administrative Officer and nine Planning Officers; one for Continuity of Government, one for Special Projects and seven for Services, all based in Ottawa. There are five regional representatives vis. Atlantic Provinces, Quebec, Ontario, Prairie Provinces, and British Columbia.

11.10.1.2 Scientific Activities

The Division makes use of research findings in the formulation and application of standards, guidelines and operational procedures in its program. The staff is involved in various aspects of practical research for the definition of policy. For example, all EWS operational

equipment and supplies require professional and technical research before production. Experiments continue to test their effectiveness and give a basis for improvement. A Special Projects Officer is responsible for heading up practical research projects in collaboration with the Service Officers who have particular responsibility for participating in the study concerned.

Because of the nature of the work of the Division - both in an advisory capacity and in the active field of training, professional personnel must be in possession of up-to-date scientific information in their fields.

Scientific data collection is continually used as the statistical basis for policy development and program management.

11.10.1.3 Co-ordinating Mechanisms

The functions and responsibilities of the Division to other Federal agencies involves the integration of policies and procedures on a national level in order to stimulate provincial and municipal emergency planning.

Professional and technical advice is exchanged both on inter-departmental and intra-departmental levels.

The Division maintains close liaison with the following Federal agencies:

- Canada Emergency Measures Organization.
- Department of National Defence, including Defence Research Board.
- Emergency Supply Planning Branch of the Department of Defence Production.
- Divisions within DNH&W, including Emergency Health Services, Child and Maternal Health, Nutrition, Public Health Engineering, Mental Health, Hospital Insurance and Diagnostic Services, Divisional Directors of regular welfare programs.

Scientific and technical advice sought have included:

- Nutritional requirements under specific emergency conditions (DRB; Nutrition Division, Department of

National Health and Welfare; Canadian Council on Nutrition).

- Ration specifications for particular situations.
(DND Research and Development Section, Industry)
- Food Service layouts for special emergency sites (Hospital Insurance and Diagnostic Services, Dept. Nat. Health and Welfare)
- New techniques in teaching aids for EWS training program
(Industry).
- Development of forms and systems (Industry).

A continuing EWS Advisory Committee consisting of professional provincial personnel meets twice yearly. Ad hoc working groups composed of experts in specific fields are appointed as required by the Advisory Committee. A recent example is an Ad Hoc Committee for the development of a prototype Welfare Centre Kit containing the minimal supplies required to establish and operate a welfare centre in emergency until further supplies become available.

Federal-Provincial Conferences for discussion by senior provincial and federal welfare departmental officers are held at least annually for acceptance and standardization of recommendations made by the Advisory Committee.

Industry

Indirect liaison with industry is an integral part of the stockpile program for procurement of equipment, systems and forms, as well as in the overall planning for essential supplies during a national emergency (through Emergency Supply Planning Branch).

Educational Institutions

Staff members maintain contact, by means of periodic visits and follow-up with university faculties of Home Economics and Dietetics and Schools of Social Work to determine extent and scope of EWS subject matter in curricula and to ensure availability of EWS materials. University instructors receive training at courses conducted by federal staff at the Canadian Emergency Measures College at Arnprior, Ontario.

This has resulted in the introduction of new material into their curricula.

Staff participate also as speakers, leaders and resource personnel at:

- learned and professional societies at provincial, national and international levels.
- workshops and institutes for related professional groups.
- conferences and meetings of key provincial welfare departmental personnel.

International

Professional staff have prepared and presented scientific papers and represented the Division at international meetings such as the Scientific Working Group of NATO and the Commonwealth Defence Science Organization.

Contact with personnel carrying on similar activities in the Department of Health, Education and Welfare, and Department of Defence, Office of Civil Defense (USA) has provided a continuing source of information exchange and the development of paralleled EWS systems.

Other

Through its system of collaboration with recognized groups involved in common problems, information on subject matter and methodology is currently obtained. Examples are Salvation Army, Canadian and American Red Cross, Women's Voluntary Service (UK).

The operational effectiveness of the Division is reviewed and revised by processes such as the preparation of a Program Analysis and Evaluation (SIMPAC) and the recent "Phoenix" Study directed towards the overall evaluation of civil emergency planning programs.

Disaster Research

Funds are available from Canada Emergency Measures Organization in support of research projects at the Ohio State Disaster Research Centre. Each year the EWS Division evaluates and recommends the credentials of a student applying for a fellowship there. Funds are available also to engage research personnel directly to carry out

relevant sociological studies for the EWS Division.

- 1) Projects which have significance for all departments engaged in emergency planning are selected by Canada EMO for study. For example, a survey on availability of shelter space has been initiated and this has implications for the EWS program. Surveys on availability of essential supplies conducted by Emergency Supply Planning Branch influence the EWS public education program.
- 2) Priorities are established according to life saving criteria.

Technical Information

Scientific and technical reports and documents are channelled to EWS Division from the Canada EMO Scientific and Technical Information Centre. Scientific NATO reports are received regularly also. This literature is screened and content significant for EWS analyzed. The findings are appraised for adaptation to new approaches and course of action relevant to Canadian emergency planning.

Regional Implications of EWS Activities

Certain regions in Canada, due to their peculiar emergency planning problems, present opportunities for particular investigational studies. Examples are British Columbia where evacuation from its two large cities would result in special problems and a heavily populated area such as Ontario with several high risk of damage areas.

Although activities relating to regional problems or phenomena have not been carried out on a regular yearly basis, the following studies have been conducted over the past several years at federal expenses:

- Four pilot lodging resources surveys have been conducted at the municipal level in different provinces to serve as models for other communities and to provide training in this area for provincial personnel. - Two surveys have been conducted at municipal level to determine the probable amount of used clothing which would be available in an emergency. - Surveys of manpower resources critical to EWS operations have been started. Personnel presently employed in the field of welfare are being categorized. Provincial membership

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lists from related professional and technical associations have been secured for EWS essential records. Currently, the Division is investigating the possible EWS manpower resources within the teaching profession.

The preparation of emergency plans at provincial and municipal levels is a contributing factor to total regional development. In summary the responsibilities and powers assigned to the EWS Division by Civil Emergency Measures Planning Order (P.C. 1965-1041) and the EWS Emergency Regulations have been effective in directing the activities and the program to the point where national policy has been defined, EWS systems have been devised, plans are up to date, training is in effect, operational equipment is in position across Canada and a public education program exists.

11.10.2 International Welfare Division

This Division plays a pivotal role in Canada's active participation in the social welfare and social development work of the United Nations and its Specialized Agencies and of various international voluntary organizations. At the United Nations Canada is represented on the Economic and Social Council and the Commission for Social Development, is a member of the governing bodies of the United Nations Children's Fund (UNICEF) and the International Labour Organization and actively participates in the work of a number of related organizations such as the Society for International Development and the International Social Security Association. The Department provides representatives to such organizations, participates in international studies and contributes to the development of Canadian policy in this sector.

The Division is not primarily engaged in any research in any field but closely monitors research relevant to its program, notably in relation to UNICEF, the United Nations Commission for Social Development and the Third Committee of the General Assembly. The Department has recommended that Canada support research by the United Nations through financial and moral support of such bodies as the Research Institute on Social Development, the Institute for Training and Research and the Social Defense Institute for the purpose of expanding knowledge in these areas. Members of the Department have undertaken studies while on United Nations assignments. The Director-General of Special Programmes, as Canadian representative to the Commission for Social Development, (February - June 1968) is one of five Special Rapporteurs examining UN aid programs in the social development field.

11.10.2.1 Scientific and technical information activities

The Division serves as a clearing-house for requests to the Department from other countries, United Nations bodies, and other international non-governmental organizations such as the International Social Security Association for information on Canadian welfare programs. The Division, with technical assistance

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from the Research and Statistics Directorate provides this information, or as required, supplies personnel to represent Canada at international meetings as discussed above. The Division receives information on welfare programs in other countries and those of the United Nations and this information is routed to the appropriate units in the Department for use.

11.10.2.2 Training of scientific manpower.

The Division arranges placements for graduate and undergraduate students of social welfare, public administration and related fields studying in Canada under the External Aid program. The Division also cooperates with the External Aid Office to find Canadian personnel to take on assignments as advisors in projects in the social welfare and related fields in developing countries. The staffing of a project in Tanzania is an example.

On an ad hoc basis staff members of the Division have addressed students at the McGill School of Social Work on Canadian activities in the international social development or social welfare field.

Personnel of the Division have attended university courses directly related to the person's job responsibilities.

The Division's efforts, in relation to the training of manpower are directed towards improving the capabilities of the Division's staff to function effectively, towards the use of trained Canadian personnel as advisers in developing countries, towards the utilization of facilities in Canada to train persons from developing nations in the social welfare field.

11.10.2.3 Conferences

The Division's activities have most recently been focussed on planning for Canadian participation in the Conference of Ministers Responsible for Social Welfare, held at the United Nations, September 3 - 12, 1968, at which the four main topics under consideration were:

- a) Social welfare within the framework of national development;
- b) Manpower needs for social welfare;
- c) Governmental responsibility for social welfare;
- d) International cooperation in the social welfare field.

11.10.2.4 Coordinating mechanisms

Federal Agencies - The Division has on an ad hoc basis invited other federal departments such as Labour, Manpower and Immigration, the External Aid Office, C.M.H.C. and D.B.S. plus national voluntary organizations such as the Association of Universities and Colleges of Canada and the Canadian Welfare Council to review and comment upon UN program reports and program proposals in terms of formulating Canadian policy positions for use at sessions of the UN Commission for Social Development, the Conference of Ministers Responsible for Social Welfare, etc. The Division represents the Department on interdepartmental committees, e.g. the Committee on UN Specialized Agencies, the Committee on Human Rights, the Committee on Canadian Contributions to UN Voluntary Programs, the Committee on Canadian Information Abroad.

International

Liaison is maintained with members of the Secretariats of the United Nations and its Specialized Agencies such as UNICEF, and the ILO, social welfare and social security departments of other countries, officers of international non-governmental organizations such as the International Conference on Social Welfare and the International Social Security. Close cooperation is maintained with the Canadian Council for International Development (C.C.I.D.) which was formerly the Overseas Institute of Canada and which co-ordinates the activities of the voluntary organizations active in the international aid and development field, and it is hoped that the resulting knowledge and contacts will be used more fully in the future in terms of the Department's involvement in finding Canadian personnel for assignment to welfare projects in developing countries. The Deputy Minister of National Welfare and the Director General of Special Programmes are members of the Society for International Development and the C.C.I.D.

11.10.3 Fitness and Amateur Sport11.10.3.1 Programme objectives

The Directorate is responsible in collaboration with the National Advisory Council on Fitness and Amateur Sport for the administration of the Fitness and Amateur Sports Programme.

The objectives of the programme are enumerated in Section 3 of the Fitness and Amateur Sport Act of 1961. Generally this Act is designed to encourage, promote and develop both fitness and amateur sport in Canada through assistance for the promotion and development of Canadian participation in national and international sports, for the training of coaches and professional personnel, the carrying on of research, surveys and other related activities. The Act also gives the Minister of National Health and Welfare responsibility for co-ordinating all federal activities related to the encouragement, promotion and development of Fitness and Amateur Sport.

11.10.3.2 Grants to promote research activities in Fitness and Amateur Sport within this overall programme

The National Fitness Research Grants were established to encourage investigations in the fitness and amateur sport field. The objectives of this specific programme are:

- (a) to augment the supply of trained research scientists;
- (b) to assist in the expansion and improvement of graduate education; and
- (c) to encourage and foster research in areas directly related to fitness and amateur sport.

Applications for grants are received from individuals usually faculty members of Canadian universities for projects having a definite relevance to the objectives of the Fitness and Amateur Sports Act. The Research Review Committee of the National Advisory Council on Fitness and Amateur Sport reviews all submissions and makes recommendations through the Council to the Minister. Particular importance is attached to the merit of the projects in areas where new knowledge or new methods are required.

11.10.3.2.1 The Grants System

These grants are made as contributions toward the normal operating costs of specific projects proposed by the principal investigator. They are not meant to cover the full cost. Space, basic facilities, and basic equipment are to be provided by the institutions in which the studies are to be undertaken. Normally, the grant may cover stipends for research assistants, technicians, and stenographic assistance; essential supplies and materials; essential travel, special essential equipment; and computer time. Stipends are based on NRC annual rates.

11.10.3.2.2 The Procedure

All grants are made on a reimbursement basis to the institution upon receipt of expenditure claims which are usually submitted quarterly.

The grants are made on an annual basis. Renewal is contingent upon submission of a satisfactory progress report and a new application which will include the budget and any pertinent information not included in the original application. Up to \$150. of the total grant may be expended on required travel at the discretion of the principal investigator. Travel in excess of this amount must be approved by the Research Review Committee.

All claims for expenditure must be submitted within two weeks after the end of the fiscal year (March 31st).

Term Grants are available for a three-year period renewable for experienced senior investigators.

Final reports of completed projects are required in respect to the entire study for which a grant is made.

11.10.3.2.3 Associateships

Universities offering graduate programmes in physical education may make application for the support of Fitness and Amateur Sport research associates for a three year term at normal salary rates. It is expected that associates would become permanent university faculty members at the end of the three year appointment.

As a result of a review of the programme, it has been seen fit to discontinue three fitness research units after a 5 year period as of March 31, 1969. A system of research associates will be begun because it is considered timely to increase the location of activities and number of full time researchers across Canada rather than continue to concentrate efforts in three locations. (c.f. regional distribution of departmental activities)

11.10.3.3 Grants for training of scientists

The programme requires a constantly increasing number of professionally qualified physical recreation educators and research scientists. From its outset it has provided for aid to students in this field.

Three types of grants-in-aid for professional post-graduate study are provided. These are:

- (a) post-graduate scholarships, for superior students working toward the Master's and Doctor's degrees in physical education and recreation;
- (b) post-graduate research fellowships for persons holding doctorates in physical education, recreation or the biological sciences, who have already made significant contributions to fitness research and wish to pursue special investigations or studies designed to aid the programme;
- (c) special fellowships for senior persons, to carry out administrative or other studies.

11.10.3.4 Canadian Documentation Centre for Fitness and
Amateur Sports

The Department administers a documentation centre for fitness and amateur sports.

The Centre whose services are national in scope, collects, classifies and makes available factual information concerning fitness, recreation and sport. It is essentially a bilingual repository of selected publications, records and documentation and a referral medium through which additional information can be obtained from recognized sources.

Since the Documentation Centre is national in scope, individuals, agencies, associations, organizations, institutions and government departments at all levels and in all parts of Canada are welcome to use the Centre's services.

11.11

GENERAL ADMINISTRATION BRANCH

The goals of this Branch are as follows:

- (a) to advise the Deputy Ministers on matters of administrative policy;
- (b) to manage the organization and resources of the Administration Branch to effectively provide management, advisory and support services to the Deputy Ministers and individual programs; and
- (c) to give functional direction to program branches within the areas of competence of the Administration Branch.

Introduction of a new managerial process

Following the recommendations made in the Report of the Royal Commission on Government Organization (the Glassco Commission) the Department is gradually introducing a new management process involving major contributions by all divisions of the General Administration Branch.

Program directors have been making extensive efforts to increase efficiency through concentration on the Department's most important work by a project priorities system, changes in organization, and a variety of other approaches developed within smaller decision making units. While these individual efforts have resulted in some significant cost reductions in specific areas, there is further need for a common managerial process which is easy to understand, teachable to all levels, and usable by all program directors in their managerial roles of operating the Department.

The managerial process is expected to include the following features:

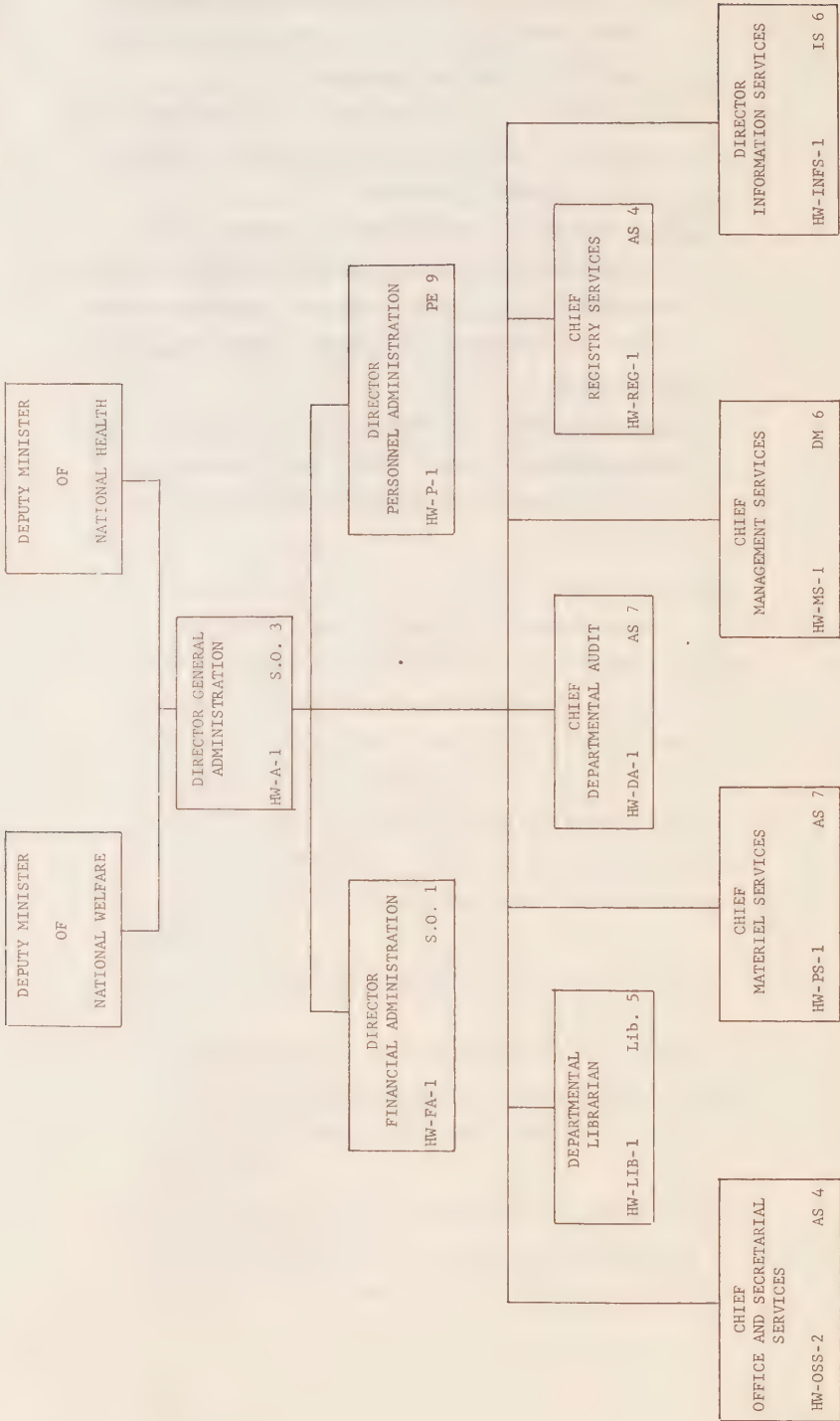
- (a) a systematic periodic review by Deputy Ministers and Directors General of future program needs and current problems, in order to identify important and challenging goals for a specific period of time;
- (b) sufficient and continuous communication from senior management to provide department personnel with a personal sense of direction and a commitment to the results to be produced.

- (c) a periodic review of work in process, with flexibility to adjust, based on new input from senior management and the experience at each working level;
- (d) a program and an individual review system that permits each organization and each individual to measure contributions to the Department's goals; and
- (e) an approach that ensures that only essential work is undertaken, with minimum duplication or overlay in assignments.

Management advisory and support services provided to scientific units of the Department are described in the following Sections of this Brief.

Services provided by the Personnel Administration have already been described in Sections 10 and 11 earlier in this Brief entitled "Personnel Analysis" and "Personnel Policies" respectively.

NATIONAL HEALTH AND WELFARE
ADMINISTRATION BRANCH - 1
GENERAL ORGANIZATION



11.11.1 Financial Administration

Financial Administration is directly involved in the administrative aspect of scientific activities.

11.11.1.1 Objectives

The objectives of Financial Administration are to:

1. Provide a basis for long and short term planning.
2. Develop a management reporting system that will result in the timely flow of information to all levels of management in a format that will enable management to control and utilize the resources assigned to it and in the most effective manner possible.
3. Develop an accounting system.
4. This accounting system would be designed so as to provide a detailed costing of each scientific activity.
5. Develop a cost benefit analysis system.
6. Interpret legislation and help develop guidelines to assist scientific projects.

11.11.1.2 Present Level of Development of Financial Administration

Financial Administration is currently developing these objectives for the department as a whole and is planning on building in the special requirements of scientific activities.

A management reporting system has been developed and reports are being prepared for management. The necessary accompanying accounting system has been developed. Long and short term planning has in broad terms been instituted. Legislation is being interpreted.

11.11.1.3 Future Plans

Financial Administration is working on refining present reporting, accounting, and planning methods and procedures. Further development is necessary in providing costing by projects. Considerable liaison work is still to be done with Research personnel to define their needs. With better definition, the reporting and accounting systems will then be able to provide Research personnel with more accurate detailed and timely reports. Considerable work is also required to be done in the field of cost benefit analysis. With these tools, a much more comprehensive cost evaluation service can be provided to Scientific Research in present, short, and long range planning needs.

11.11.2 Management Services Division11.11.2.1 Authority and Objectives

The Management Services Division was created in the Administration Branch of the Department less than three years ago. It provides management consulting services within the Department. This objective is met by responding to the requests for consulting services, by identifying areas of potential improvement, by developing and planning new systems and procedures, and by assisting managers in implementation.

11.11.2.2 Personnel

Today, the Division has 16 officers. It is staffed with both Organisation and Method Analysts individually specialising in systems and procedures, industrial engineering, directives management, work simplification, office equipment, organisation, forms management and design, computer systems and programming, paperwork systems.

The Division sponsors the application of the principles and techniques of scientific management throughout the Department.

11.11.2.3 Contribution to Scientific Activities

Although not doing scientific research "per se", this Department's Management Services group assists the scientist in his managerial functions by providing him with up-to-date advice on new equipment and systems. Researchers increasingly use electronic data processing equipment to speed up their work. Here are some examples of the Management Services Division's contribution to facilitate scientific research:

1. Scientific Information Retrieval System

Participation in the forming of long term policy and a program for the development of a coordinated national scientific and technical information system.

2. Air Sampling Program

The development of a system to record, collect, assimilate and present data on air pollutants present in the atmosphere.

3. Computers

The preparation of a submission for the Committee on Computers for Research.

4. Microfiche

A study of the possibility of acquiring scientific reports in Microfiche form.

5. Dietetics

A study to assess the feasibility of using computers to process food value data and to report on totals and percentage of food values.

6. Food and Drugs

The development of an information retrieval system for the collection, organisation and classification of data on pharmaceutical, narcotic and food products, and the implementation of such system.

The Management Services Division's various skills have been applied to the solution of numerous other problems such as radiation protection, medical statistics, scientific library information, the preparation of scientific manuscripts for publication, etc. All in all, the Division has made a meaningful contribution to the advancement of scientific research.

11.11.3 Departmental Library11.11.3.1 Authority

The library is responsible for the selection, acquisition and organization of research and technical books, serials, pamphlets and government documents on all subjects related to the Departmental programs, and related information and advisory services. General authority for the establishment and maintenance of that unit is provided for in the Department of National Health and Welfare Act.

11.11.3.2 Objectives

In addition to services outlined in 11.11.4.1, further attention is given to evaluative studies of records and reports of library and specialized information centre programs and their theoretical application to Canadian circumstances for the development of a national health sciences information communications program.

11.11.3.3 General Description of the Library Collection and Its Scope

The departmental library primarily supports research and other information requirements of the professional staff of the Department. The library further provides services at the request of other libraries for the support of research in other agencies. The subjects of departmental interest fall within categories of:

- (1) health sciences
- (2) social sciences groups of sociology, economics and psychology

The number of volumes in the Departmental Library is estimated to be 80,000.

- (3) Nature of materials included

Part I - Library

- (a) books and pamphlets in open publication
- (b) government documents, chiefly Canadian, American and British. Other countries are also represented.
- (c) Periodicals, 3600 titles, 2300 current subscriptions.

- (d) Unpublished reports, such as those related to research grant projects, when authors approve placement in library.

PART II - Films

Collections of 16 mm. motion picture films are administered by the Information Services Directorate of the Department of National Health and Welfare and located in the Canadian Film Institute, 1762 Carling Avenue, Ottawa.

11.11.3.3.1 Collections

- i) The National Health Film Library, a collection of some 518 film titles covering alcoholism, anatomy and physiology, blindness, cancer, cerebral palsy, dental health, first aid and safety, hearing, heart disease, hospitals, immunization and disease prevention, industrial health and safety, maternal and child health, mental health (including child psychology and child training), nurses and nursing, nutrition, personal hygiene (eyes, ears, feet, etc.), physically handicapped, public health organizations, rehabilitation, sanitation, sex education, smoking and health, tuberculosis, venereal disease, and miscellaneous.
- ii) National Welfare Film Library, a collection of 35 film titles dealing with adoption (including foster home care), child welfare general, community relations and racial prejudice, housing, juvenile delinquency, marriage and family life, old age, social psychology, social welfare, social work and social agencies.
- iii) National Medical and Biological Film Library, a collection of some 307 film titles covering anesthesia, anatomy (including histology and embryology), bacteriology, botany, dentistry, disease (pathology, diagnosis, treatment), laboratory technology, nursing (including hospital administration), obstetrics and gynecology, occupational and physical therapy, parasitology, pediatrics, physiology, preventive medicine, psychology and psychiatry (including neurology), public health, radiology, surgery, zoology and miscellaneous subjects.

Special Committee

- (iv) Fitness and Amateur Sport Film Library with a collection of some 200 films covering community organization for recreation, exercise and gymnastics, leadership, outdoor activities, physical and health education, safety, sports and games, aquatics, archery, badminton, baseball and softball, etc.

11.11.3.4

Administrative ArrangementsLibrary

Most printed material is of U.S., British or Canadian origin.

Subscriptions for periodicals, include titles from France, Germany, Switzerland, Italy, Belgium, Holland and Scandinavian countries, British Commonwealth countries and Japan.

Publications from Eastern European and Asian countries are generally government documents.

Films

Countries of origin of motion picture films are estimated to be: 60% U.S.A., 15% Great Britain, 15% Canada, 10% others including France, Germany, Holland, Australia and South Africa.

Chronological limitationsLibrary

No time limit is placed on serials related to health science and social welfare subjects. Titles held elsewhere in the federal government on chemistry, economics, etc. are cut back from time to time.

Obsolete textbooks are discarded.

Lists of publications descriptive of the library collection of books, serials, government documents, etc., are not available.

Catalogue records of all library acquisitions are deposited with the Union Catalogue of the National Library.

Films

Obsolete motion picture films are discarded. Occasionally older films are kept when no satisfactory replacement is available.

11.11.3.5

Services and Users

Reading room facilities are available for:-

- departmental staff
- staff of other federal government departments
- staff of health science agencies located in Ottawa
- teaching staff of local universities and colleges
- private medical practitioners
- staff of provincial and municipal governments
- visitors of professional standing
- university students, by introduction of university librarians.

11.11.3.6 Future of the Library

Starting 1968-69, the Library functions will be incorporated into a new total communication system which is described in sections 17.1 and 18 of this Brief, respectively.

11.11.3.6.1 Communication Service

This new sub-activity will include the present Library sub-activity. The objective of this communication service is to provide expert scientific and technical information service to departmental programs and other user agencies. More precisely, the objective is to develop the means and to provide authorized users with the information needed, when and where needed, and in the form best suited for the use, regardless of the source or location of the information.

11.11.4 Information Services Directorate11.11.4.1 Organization and Responsibilities

Information Services Division is the Department's production and coordinating centre in the fields of public health education information, publicity and public relations. It is responsible for the preparation, production, dissemination and assessment of informational material related to the work of the Departmental divisions. It is administered by a director, with two assistant directors, one supervising health information, the other the welfare aspects of the division's operations. To facilitate communication with officers responsible for specific programmes, information officers are assigned to service specific health or welfare divisions of the department.

11.11.4.2 Activities

The division produces and distributes informational material in all forms and through all channels employed in modern communications, including booklets, pamphlets, radio scripts, television scripts and film clips, films, photographs, audio-visual materials, advertising in all media, mass circulation magazines, daily newspapers, employee magazines, trade journals, direct mail, displays, posters, technical publications and others* It maintains close and constant liaison with representatives of the news media. It also provides the department's information liaison with other federal government departments, provincial governments and volunteer organizations.

The division is the department's liaison agency with The Queen's Printer, National Film Board and Canadian Government Exhibition Commission.

The division's information officers maintain also close liaison with print and broadcast media and, in the preparation of technical information for the highest possible standards for publication or broadcast. Besides initiating news and feature material, and a regular distribution of news fillers, the division provides

* See Annex for details of output

assistance to writers, reporters and editors in covering events or subjects concerning the work of the department, and in preparing or interpreting health and welfare information. In this way the public is informed of scientific findings produced or released through the various health divisions, as well as details on the programmes of income security and welfare.

Information officers assist other divisions to organize and conduct meetings, conferences, conventions and special events. This assistance includes arranging for room space, accommodation, stenographic, secretarial and simultaneous interpretation services, public address systems, communications and other requirements. They participate in conferences and conventions that deal with matters of welfare and health, maintain close liaison with field staffs in both areas and attend meetings and other functions presented by provincial and volunteer organizations. Public understanding of the work of the department is monitored and steps are taken to improve the communication of reliable information.

Information officers also serve the media in advisory and informational capacities on special request. This service ranges from providing answers to telephone inquiries to writing special articles or scripts.

To keep Canadians aware of the department's activities and programs affecting their health and welfare, the division conducts various types of publicity through regional and local offices. An example of the larger type of campaign is one designed to increase the awareness of those eligible for welfare benefits, that such benefits exists, to encourage them to apply, and to give them the basic facts of the program.

11.11.4.3

System used for Review Purposes

All materials produced by information services for other divisions of the department are thoroughly checked for technical accuracy, evaluated and approved by officials of the originating division at various stages of production. Final scripts are submitted for

approval to a Deputy Minister or to the Minister.

11.11.4.1 Facilities of Technical Information Services include:

11.11.4.1.1 A production office, equipped with materials and implements necessary for producing rough and finished art, graphs and charts, other illustrative items.

11.11.4.1.2 The divisional press clipping service, through which clippings are collected from a wide variety of newspapers and magazines. These clippings are on subjects relating to health and/or welfare fields and are circulated to appropriate divisions, keeping staff in touch with many developments in these fields.

11.11.4.1.3 The distribution section is responsible for sending supplies of printed materials to provincial distribution points as well as to organizations or individuals requesting single items or smaller numbers of items. This section also ships to radio stations the long-play records containing the departmental educational playlets titled "Your Health, Your Welfare".

11.11.4.1.4 The film library coordinates requests from a large number of sources for films and filmstrips on subjects of interest to the department.

11.11.4.1.5 Largest of the individual facilities is the biological photographic laboratory which specializes in microphotography, for which it has at its disposal a number of expensive and modern pieces of equipment, including two photomicroscopes. In addition, much standard photography is undertaken by this section, both color and black and white. Within the framework of this section is a compact, modern film theatre, suitable for showing films, filmstrips and television clips. Its equipment includes several projectors and tape recorders, available on request to other divisions of the department.

11.11.4.1.6 Training and re-training of manpower

Supervision of graduate students: summer session only.

Participation in conferences of national professional societies health and welfare fields, and of Canadian Public Relations Society.

Staff development programs are conducted by Canadian Public

Relations Society and within Information Services.

Brochures on health and welfare careers are edited and published by Information Services.

11.11.4.5 Budget

The budget for all information activities administered by the division was as follows:

1966-67	-	\$433,689
1967-68	-	\$496,495

EXPENDITURES

	Operating Expense in '000	Capital Funds in '000	TOTAL Scientific Information
1962-63	258.0	2.0	260.0
1963-64	256.9	1.4	268.3
1964-65	328.3	3.5	331.8
1965-66	383.4	8.5	391.9
1966-67	430.4	3.3	433.7
-	-	-	-
1968-69	471.1	9.0	480.1

11.11.4.6 Coordinating Mechanisms

The division is the department's liaison agency with The Queen's Printer, National Film Board and Canadian Government Exhibition Commission. In addition close working relations are maintained with the following agencies:

Education

L'Association canadienne des éducateurs de la langue française

Association of Universities & Colleges of Canada

Canadian Association for Adult Education

Canadian Education Association

Canadian Home & School & Parent-Teacher Fed. Inc.

Special Committee

Canadian Teachers' Federation

Metropolitan Educational Television Assn. of Toronto (META)

Social Science Research Council of Canada

Science and Technology

Canadian Nuclear Association

Chemical Inst. of Canada

Health

Canadian Federation on Alcohol Problems

Canadian Arthritis & Rheumatism Society

Canadian Cancer Society

Canadian Diabetic Association

Canadian Assn. for Retarded Children

Canadian Foundation for Poliomyelitis and Rehabilitation

Canadian Mental Health Association

Canadian Public Health Association

Canadian Tuberculosis Association

Health League of Canada

Welfare

Canadian Association of Social Workers

Canadian Red Cross Society

Canadian Welfare Council

St. John Ambulance

Medical

Assn. des Medecins de Langue Francaise du Canada

Canadian Dental Association

Canadian Medical Association

Royal College of Physicians and Surgeons of Canada

Canadian Pharmaceutical Association

Pharmaceutical Mfrs. Assn. of Canada

Proprietary Assn. of Canada

Canadian Hospital Association

Canadian Nurses Association

Canadian Association of Occupational Therapists

Canadian Dietetic Association
 Canadian Physiotherapy Association
 Canadian Psychiatric Association
 Canadian Highway Safety Council
 National Safety League of Canada

Federal Government:

Agriculture
 Atomic Energy Control Board
 Can. Emergency Measures Organization
 Can. Government Printing Bureau
 Centennial Commission
 Consumer and Corporate Affairs
 Dominion Bureau of Statistics
 Energy Mines & Resources
 External Affairs
 External Aid Office
 Fisheries
 Indian Affairs & Northern Development
 International Joint Commission
 Manpower & Immigration
 National Defence
 National Film Board
 National Research Council
 Queen's Printer
 Public Service Commission
 Public Works
 Secretary of State
 Solicitor General
 Transport
 Veterans Affairs

Provincial Governments:

Departments of Health
 Departments of Welfare

U.S. Government:

Dept. of Health, Education and Welfare

11.12

RESEARCH AND STATISTICS DIRECTORATE

The Research and Statistics Directorate is primarily a service-oriented organization established to meet the Department's responsibility for "investigation and research into public health and welfare". (1)

This involves the collection, analysis, and evaluation of basic information on the socio-economic aspects of health, welfare and social security. Particular emphasis is placed on the study of underlying principles, costs, methods of financing, social effectiveness and administrative methods. Its functions have steadily increased as have the Department's programs in support of health and welfare measures in Canada and abroad. Some of the newer activities of the Directorate are the result of vastly improved technology in data processing.

11.12.1

Levels of research

The Directorate's research activities may be viewed in terms of four different levels.

A number of senior officers serve as consultants to the health and welfare management of the Department, in the planning and development of new programs, and in the evaluation of existing programs. Research may be carried out, for example in relation to cost estimates, which requires testing various assumptions regarding future developments of programs or modification in existing programs, and consideration of various economic influences on future costs, such as wage trends, living costs, and so on. It may be necessary to develop models of utilization of services, to estimate public response to programs, and to analyze gaps, deficiencies or over-lapping features of existing programs. Study of future needs and requirements is also of great importance.

A second level of research deals with the collection, preparation, and dissemination of scientific information relating to health and welfare. The information collected by

(1) The Department of National Health and Welfare Act, Section 5(b)

the Directorate is made available to the Minister, Deputy Ministers, and other senior officers of the Department and to other interested agencies and individuals.

A third level of research is concerned with the conduct of applied research in the health and welfare fields. This involves the testing of specific hypotheses, analysis and evaluation of data collected, and possibly preparation of a Research memo or publication, available for study and use by interested persons outside the Department. It may also involve advising other divisions of the Department on research methodology.

A fourth level of research is concerned with fundamental problems of general scientific interest in the biological, physical and social sciences. While such research stems from departmental interest in a particular field, the findings derived from this research are generally not as immediately and directly applicable to the operation of the program concerned, although in the long run it might influence both the practice and procedure.

11.12.2

Organization

Headed by a Director, who is directly responsible to both the Deputy Ministers, the Deputy Minister of National Health and the Deputy Minister of National Welfare, the Directorate is organized into four divisions and a unit on International Welfare and Special Projects. Each division is composed of several sections as listed below.

(1) Health Research Division

- i) Medical Care Section
- ii) Hospital Care Section
- iii) Public Health Section
- iv) Health Expenditure and Resources Section

(2) Welfare Research Division

- i) Social Assistance and Family Planning Section
- ii) Community Studies Section

Special Committee

iii) Welfare Economics Section

(3) Social Security Research Division

i) Income Maintenance Section

ii) Canada Pension Plan Section

iii) Financial Analysis Section

(4) Biostatistics Division

i) Medical Statistics Section

ii) Hospital Statistics Section

iii) Program Statistics Section

(5) International Welfare and Special Projects

i) Special Projects

ii) Consultant in Aging

11.12.3 Research and Development Activities of Divisions

11.12.3.1 The Health Research Division has the responsibility for assisting the Health Services and Health Insurance and Resources Branches in developing various health programs undertaken by the Department. Its research activities relate to the medical care program, the health resources fund, health care aspects of the Canada Assistance Plan, the hospital insurance program, public health and rehabilitation services, health programs in other countries, health expenditures, health personnel, and health economics in general. The kinds of investigation it undertakes include complex research into voluntary and governmental health insurance programs, health care programs for specific diseases or special groups, patterns of health service organization, the supply of and needs for health manpower, hospital facilities and other health resources, methods of financing, prices and expenditures. The types of problems it deals with include cost and utilization experience, cost control techniques, payments to suppliers of services, coverage and benefits, premium structures, new concepts for program development, methodology for statistical development and reports, cost estimates and forecasts, availability and quality of health care in relation to health needs,

hospital bed requirements, manpower and training facility needs, and so on.

11.12.3.2

The Social Security Research Division is concerned with the design, development and continuing evaluation of a number of income maintenance programs, both federal and provincial. These include family allowances, old age security, the Canada Pension Plan, the Canada Assistance Plan, and the Guaranteed Income Supplement program. The Division provides research and statistical support to the various income maintenance programs, which involves the development of concepts and principles relating to social security and social security expenditures. It also prepares cost estimates for existing and new social security programs. In the international area of social security, the Division cooperates with the International Social Security Association (I.S.S.A.), International Labour Office, (I.L.O.), and performs necessary studies required for complete I.S.S.A. questionnaires and to evaluate the effects of existing or proposed I.L.O. Conventions on Social Security Programs in Canada.

Its responsibilities include research into the concept, nature and measurement of poverty in Canada. The Division is also concerned with the development of new programs, and with the continued evaluation of existing programs including suggesting ways and means of improving their effectiveness. Research relative to the Canada Pension Plan (CPP) and the Guaranteed Income Supplement (GIS) are examples of programs in which the research work of this Division was an important contributory factor to the ultimate design.

11.12.3.3

The Welfare Research Division carries out research in general assistance programs, family and child welfare, services for the aged, welfare economics, welfare manpower. Considerable expansion is planned with emphasis on research related to programs included under the Canada Assistance Plan. An effort is underway to implement a system of federal-provincial

welfare statistics which would provide comparable data from province to province. Also underway are special community studies emphasizing the factors contributing to the alienation of particular groups within society and measures which might prevent or alleviate such alienation. Other regular activities of the Division include participating in the assessment of research projects submitted to the Welfare Grants Division; surveying annually the enrolment in the schools of social work; estimating costs and providing technical assistance in connection with programs under the Canada Assistance Plan; and generally keeping abreast of welfare developments and legislation across Canada and in other countries. A Consultant on Aging advises the Department and outside agencies on special services for the aged.

11.12.3.4

The International Research and Special Projects Unit is responsible for research on the international welfare concerns of the Department and for special studies on emergency welfare services, fitness and amateur sport, and topics that help to demonstrate a rounded role for the Department in welfare research. More particularly, the functions of this unit are: to render research assistance and consultative services to the Special Programmes Branch of the Department, in the fields of international welfare services and physical fitness and amateur sport; to coordinate research entailed in the request of international agencies for welfare studies and surveys (excepting social security); to conduct analyses of United Nations documentation, comparative studies of welfare, and special assignments for the International Welfare Division; to ensure the maintenance and publication of the inventory of welfare research projects in Canada; and to interpret the significance of departmental welfare research activities.

11.12.3.5

The Biostatistics Division has been actively involved in a wide range of research studies. Studies have been undertaken with the Epidemiology Division in relation to the effects of

smoking and health, the continuous surveillance of tuberculosis and related diseases as a result of the introduction of successful preventive and therapeutic programs, cancer etiology and control, accidents and their resultant effects, and other disease areas. Studies have been undertaken in conjunction with Child and Maternal Health on the care of infants in hospital, the effects of thalidomide, and the subsequent development of a surveillance system for congenital anomalies. A small amount of work has been undertaken with the Nutrition Division to study the nutritional status of selected groups in Canada. Work has been done with Emergency Health Planning on the supply, qualifications and training of health personnel. For Occupational Health, studies have been carried out on specific occupational hazards such as the radiation exposure of fluorspar miners, exposure to arsenic, asbestos, and other minerals in the mining industry, the community effects of air pollution, and the possible effects of health factors in the occurrence of aircraft accidents. For the Mental Health Division, studies have been carried out on length of stay for various diagnostic groups in psychiatric facilities; for the Virus Laboratory, assistance has been provided in evaluating attenuated virus strains and the potency of vaccines. For the Laboratory of Hygiene, surveillance has been maintained on the epidemiology of salmonella infection, and a study of hemoglobin values in the population has been completed. For the Radiation Protection Division, radiation exposure of workers to radiation in their occupation has been evaluated; studies have been carried out on the population exposed to radiation due to fallout and medical x-ray. Supporting studies of radiation levels in milk, milk consumption and uptake of iodine 131 through the thyroid have been completed.

In the field of Hospital Care, requirements for beds, staff and other facilities have been examined as well as evaluation of patterns of utilization and cost studies on the provision of

departmental services in the hospital. In addition, hospital reporting needs have been assessed in relation to requirements of both federal hospital and provincial insurance programs. Studies have also been carried out of nursing personnel to determine their functions and to recommend reorganization of functions to ensure optimum use is made of nursing personnel.

11.12.3.6

Grants in aid of Research

The Directorate provides technical assistance and advice in the development of research projects which are supported by departmental grants, and contributes to the appraisal of proposed projects, particularly for welfare research grant applications.

It also provides on request consultation to outside agencies on research design and methodology of collecting, examining, analyzing and evaluating data.

11.12.4

Scientific Data Collection

The responsibility for scientific data collection largely rests with the Biostatistics Division of the Directorate. A number of statistical reporting systems have been developed during recent years. One of the largest systems deals with the Hospital Insurance Program. Biostatistics receives two copies of the Annual Return of Hospitals. The first is received unedited and is used to prepare a Preliminary Annual Report. The second set of Returns are edited through the provinces and provide the information for the final Annual Report tabled by the Minister in Parliament. The data for the disability allowances program for a number of years have been processed to provide an Annual Report on this program. The data provided from the Poison Control Program of the Food and Drug Directorate have been processed annually to provide a comprehensive administrative and epidemiological report on poisonings occurring in Canada. The Admission/Separation forms for the Yukon and Territorial Hospital Insurance Plans have been processed annually to provide the ten standard morbidity tables approved by the Advisory Committee on Hospital Insurance.

The provincial hospital morbidity data for these tables is received and national tables are compiled, and a national analysis of morbidity by age and sex is provided and published annually. Annual statistics are prepared for the Virus Isolation Reporting System for the Virus Laboratory, the reports of radiation exposure by film monitoring are processed routinely, and periodic reports are prepared providing a comprehensive statistical analysis of the program.

Traditionally information is collected routinely from the voluntary medical care insurance programs in Canada. With the advent of a national medical care program, however, emphasis is on the development of a provincial statistical reporting system.

In the field of welfare, conferences have been held with provincial welfare representatives to develop a reporting system for the Canada Assistance Plan. This reporting system is still in its infancy however, and much further assistance will have to be provided to the provinces to strengthen the statistical reports provided. For the Canada Pension Plan, standard reporting tables on contributors have been developed in consultation with government agencies. These tables are provided annually through the computer facilities of the Department of National Revenue. Special annual tables are also provided by National Revenue concerning the professional earnings of physicians in Canada.

11.12.5

Scientific and Technical Information Activities

The Directorate provides scientific and technical information regarding health and welfare in response to inquiries made by national and international agencies, governments of other countries, research workers and students. Information is obtained from the provinces concerning the organization and administration of health and welfare services. Provincial legislation is also reviewed annually to up-date legislative changes in provincial programs. The information provides the basis of annual publication, Health and Welfare Services in Canada, which is incorporated into the Canada Year Book.

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The Directorate conducts research studies and surveys, and provides consultation services with regard to economic, statistical and scientific research related to the health and social services. It publishes a substantial amount of original data on health and welfare services and resources which are available from the Directorate. Unpublished studies are completed for use in departmental planning or are carried out at the request of individual agencies or persons. Other publications, however, are prepared for the use of the general public.

The services provided by the Directorate are used by various divisions and branches of the Department of National Health and Welfare, Royal Commissions, Members of Parliament, committees of the House of Commons and of the Senate, agencies or individuals engaged in specialized studies, provincial and voluntary agencies, universities, and such international bodies as I.L.O., I.S.S.A. and W.H.O.

Social science research requires means for making findings known as soon as possible, and in such form that the most meaningful use can be made of the data collected. The Directorate has instituted the publication of inventories of research projects in health and welfare fields compiled from returns provided by research workers responsible for the projects. Three publications are published and distributed periodically: Inventory of Welfare Research, Research Projects and Investigations into Socio-Economic Aspects of Health, and Research Projects and Investigations related to Hospitals.

11.12.6 Training of Scientific Manpower

The Directorate employs a number of university students on its staff each summer with the objective of orienting them to the application of social research in the health and welfare fields. The Director and other senior officers give lectures at various universities on health and social service programs in Canada and abroad, and the research functions undertaken by the Directorate. A number also participate in institutes, conferences, and in-

services training programs for personnel in areas such as schools of medicine, public health, hospital administration, and social work.

Studies of health and welfare manpower are conducted. Information on the training of doctors and nurses is obtained from the professional sources involved, and related to existing data on the professional resources available, the emigration and immigration of persons in these professions, and supporting data concerning their earnings, etc. However, the recent extension of activities by the Manpower Department in this field may affect the amount of work undertaken within the Department to collect such data. Through the annual returns of hospitals, information is obtained annually on the training of health personnel in hospitals. Advice is also provided to departmental persons and others involved in the study of personnel needs and related training programs for the professional and technical occupations engaged in the health and social sciences.

11.12.7 Testing and Standardization

The Biostatistics Division of the Directorate is competent in the use of statistical methods to carry out testing and standardization in a number of different fields such as radiation exposure, laboratory standards for vaccines, blood, etc.

11.12.8 Facilities and Equipment

Specialized equipment rented by the Directorate consists of a data processing centre within the Biostatistics Division, and a supply of desk calculators, adding machines, etc. The use of computers is limited to projects programmed for the Central Data Processing Computer, or in the future, Computel. In addition, other agencies such as National Revenue and the Dominion Bureau of Statistics provide information through their computer resources.

11.12.9 Research Activities

Although it would be difficult to evaluate the research activities of the Directorate in terms of cost-benefit analysis, there is no doubt that its activities contribute, firstly, to policy decisions

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and program planning in health, welfare and social security, and secondly, to the evaluation and analysis of various programs administered by the Department. Its basic objective is to serve as a research arm of the Department and to provide consultation and research services to federal, provincial and other agencies concerned with health and welfare.

11.12.10 Coordinating mechanisms—Research & Statistics Directorate

11.12.10.1 Departmental Committees

1. Committees on Planning for the 1971 Census -
 - Demographic Sub-committee
 - Economic Characteristics Sub-committee
2. Projected Mortality Trends for Major Diseases for use in estimating mortality in population projects -
 - A joint project of Biostatistics, Epidemiology and Dr. M.V. George, D.B.S.
3. Interdepartmental Working Group on Minimum Living Standards - chaired by Director of Research and Statistics.
4. Consultation and advice provided by Research and Statistics concerning the proposed 1970 DBS Family Income and Expenditure Survey.
5. Interdepartmental Co-ordinating Committee on Socio-Economic Statistics,
 - (a) Sub-committee on Linkage
 - (b) Sub-committee on Canada Pension Plan Statistics
 - (c) Sub-committee on Standard Geographic Coding
 - (d) Sub-committee on a Standard Employer Number
 - (e) Working Party on Linkage of Family Allowance Statistics
6. Federal-Provincial Conference on Economic Statistics
7. Ad hoc consultations with DBS concerning surveys with more than 10 respondents in accordance with Treasury Board's minute.
8. DBS course on Diagnostic Coding of Mortality and Morbidity.
9. Vital Statistics Council, DBS
 - (Research and Statistics have not been invited in the last few years.)

11.12.10.2 Departmental Conferences, Committees, etc.

1. Advisory Committee on Hospital Insurance
 - (a) Sub-committee on Accounting and Statistics
 - (b) Sub-committee on Quality of Care and Research
 - (c) Sub-committee on Finance
 - (d) Working party on the Annual Return of Hospitals and Revision of CHAM
 - (e) Working Party on Hospital Morbidity and Hospital Admission-Separation Records

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2. Revision of the International Classification of Diseases - Working Party and Continuing consultation.
3. Federal-Provincial Conferences on Medical Care Statistics.
4. National Conferences of the Canadian Tuberculosis Association sponsored by the Department.
5. National Conferences of Provincial Mental Health Directors.
6. Dominion Council on Nutrition.
7. Expert Committee on Congenital Anomalies.
8. The Advisory Committee on Epidemiology.
9. Federal-Provincial Conferences on Statistics for the Canada Assistance Plan.
10. Consultation on planning for the Continuous Work History Sample for the Canada Pension Plan.
11. Reclassification of Statisticians, Economists and Sociologists for the Bureau of Classification Revision.

11.13 GENERAL COUNSEL

11.13.1 This Division provides legal counsel to the Department and reports directly, as a central service function to the Deputy Ministers. The Senior legal counsel is Special Assistant to the Deputy Ministers.

11.13.2 Scientific activities

Legal Services participates in and/or provides advice on the preparation and amendment of legislation, regulations relating to scientific activities of the Department including scientific research; it reviews and advises on the legal aspects of submissions to the Treasury Board, to Privy Council and to Cabinet concerned with scientific programs or projects administered or sponsored by the Department. Applications for patents arising of discoveries made by Departmental staff or initiated by grants conducting scientific research under programs sponsored by the Department are referred to this Office for advice. This topic is discussed in greater detail in Section 13.1, Volume II of this Brief.

11.13.3 International Commitments

The Senior legal counsel of the Department as Canada's representative to the United Nation's Commission on narcotic drugs has been directly involved in the formulation of the latest International Narcotic Convention, where he served as Chairman of the drafting committee. This is the Single Convention on Narcotics Drugs 1961.

Through the External Aid Office of Canada he also acts as a consultant, to a number of Caribbean governments in the preparation of health legislation modelled along Canadian lines.

He has also completed such assignments for the governments of Trinidad and Tobago, and has substantially completed a similar project for the government of Jamaica.

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He was retained by the United Nations as an expert consultant at the recent opium conference in New Delhi, he also participated in a recent conference of United Nations in Beirut to review enforcement and other procedures pertaining to international narcotic control.

12 REGIONAL SCIENTIFIC ACTIVITIES RELATED TO DEPARTMENTAL PROGRAMS IN CANADA.

12.1 Introduction

While the functions of the Department relate to the needs of all the people of Canada on matters over which the government of Canada has jurisdiction, various distinct problems often arise in particular areas of Canada which necessitate regional approaches. These attacks on regional problems can relate to environmental conditions, demographic conditions or conditions related to the resources available within the particular region or province, to solve particular problems or to develop standards equal to those in other areas of Canada. Most programs are administered in an effort to reduce or eliminate regional disparities.

The Hospital Insurance and Diagnostic Services program accentuates the payments to provinces whose costs are below the national averages and in fact, pays a higher proportion of costs to those provinces that are below the national average due to lower salaries and wages within that region. The Health Resources Fund has made special provisions for the development of health sciences resources in the Atlantic Region. Moreover, the Health Resources Fund is expected to considerably strengthen the research facilities of regional Health Science Centres and enable Canada to have at least a dozen centres of interdisciplinary excellence to attract and retain bright minds. Other programs which render consultative services will find consultants spending more time in regions or provinces where the availability of staff or funds for the staff is inadequate and the department has met some of these regional needs by deployment of its own staff, upon request. Recently our consultants have been involved in the regionalization of hospital and community health services planning within provinces, to result in a more rational distribution of scarce resources. Special programs are developed for regions such as the northern

parts of Canada described elsewhere in this Brief where there are particular responsibilities for the Department of National Health and Welfare, and these programs may be thought of as regional in nature and are adapted to meet federal objectives. Our national Health Grants Programme evolved in relation to specific needs for Public Health development in the provinces. In addition, the Department is cooperating closely with the health and welfare aspects of the FRED program for regional development.

Some of our regional offices, e.g. the Canada Pension Plan, which have only recently been put into operation, carry potential for feedback about regional social conditions, and collaboration with provincial regional and local authorities, which have hitherto been unavailable. The operations of the regional laboratories of the Food and Drug Directorate are described in detail elsewhere in this Brief.

While our cost-sharing health and welfare programs involve us in close collaboration with provincial departments in developing health and welfare program standards other programs, for which this Department carries responsibility, are directed to specific regional conditions, requirements and capabilities described in detail below:

12.2 Regional Distribution of Scientific Activities.

12.2.1 Environmental Health

12.2.1.1 Radiation Protection Division, Regional Distribution of Activities

(a) The regional pattern of RPD spending on scientific activities is largely related to the cost of sample collection programs. In most programs the cost is spread uniformly over all provinces on a per capita basis, simply because a statistical norm for the whole country is one of the desired objectives of the program. There are a few exceptions to this, where environmental radioactivity contamination is a local problem, such as in the neighborhood of nuclear reactors and in

the far North. The costs are essentially negligible for the most part since other federal and provincial agencies cooperate in obtaining the samples. The study in the Far North is the largest item; expenses for this are about \$1,500 per annum.

(b) Regions particularly suited for studying certain radiation protection problems are those where a high concentration of a particular radioisotope is regularly observed in some environmental material; e.g., cesium-137 in the Far North and Iodine-131 in the Mid-West. Monitoring the possible spread of radioactive contamination from uranium mining and nuclear reactor operations are other examples of scientific activities that must be studied (in part at least) on location at the site.

(c) The activities carried out on an annual basis in the investigation of regional problems are:

- 1) Study of the content of cesium-137, a fallout isotope, in the human body. Radioactivity measurements are carried out on living subjects, with special attention to the people (Eskimos) who eat caribou meat. About 200-500 people are measured annually in the Far North.
- 2) Monitoring activities to control radioactive contamination from nuclear reactors along particular stretches of the Ottawa River, the Lake Huron coast line and the Winnipeg River. These activities are related to regions where nuclear reactors are built, and consequently are confined at present to localities in Ontario and Manitoba. These activities are carried out in cooperation with the provincial health department concerned.
- 3) Participation in a study of Radium and Radon levels in miners and other people in a particular mining community - St. Lawrence, Nfld.

4) Technical assessments of the safety of radiation sources in a large number of particular locations in Canada where such sources are used for industrial, medical or research purposes. Radiation safety officers and surveyors visit the locations where the sources are used to perform safety inspection and advisory functions.

(d) The RPD contributes to regional development by providing such specialized radiation safety services as are essential in the application of modern nuclear technology to industrial problems. These services include consultative advice and training courses for technicians, as well as a national dosimetry service to monitor each worker's radiation exposure.

(e) The radiation protection function is best served, and the cost/benefit ratio minimized, when operating from a central (national) laboratory. This makes most effective use of the limited number of radiation specialists in the country and the advanced laboratory facilities required.

12.2.F.2

Public Health Engineering Division - Regional Distribution of Activities

The term "scientific activities" is considered to include engineering studies required to collect and analyse data for waste and water quality assessment and control.

(a) Regional Pattern of Spending may be broken down as a percentage of the total budget for the division (\$1,350,000) for 1968-69 with Regional areas grouped as they are administered by the Division.

	Percent
(a. 1) <u>Headquarters - Ottawa</u>	- 34
(Research, Administration, Laboratory Services)	
(a. 2) <u>Ontario Region</u>	- 26
(a. 3) <u>Atlantic Region</u>	- 10
New Brunswick, Nova Scotia, Newfoundland and Prince Edward Island	

(a. 4)	<u>Eastern Region</u>	- 9
	Quebec and Baffin Island	
(a. 5)	<u>Northern Region</u>	- 9
	Alberta and North West Territories	
	except Keewatin District & Baffin Island	
(a. 6)	<u>Prairie Region</u>	- 6
	Saskatchewan, Manitoba	
	Keewatin District, N. W. T.	
(a. 7)	<u>Pacific Region</u>	- 6
	British Columbia and Yukon	

(b) Along with other Canadian and U. S. Agencies, the Division is involved in collecting and analyzing data to evaluate water quality in the Great Lakes (Ontario Region), under the auspices of the International Joint Commission. A laboratory is maintained in Kingston for this purpose. Because of the economic importance of this major resource to many North Americans, the studies required to preserve a satisfactory water quality in the Lakes are vital.

The Northwest Territories and the Yukon offer ideal areas for research and development work for waste collecting and treatment systems that must operate under Arctic conditions. The Division has the primary responsibility for controlling and abating water pollution resulting from the operation of federal government installations which are located in all provinces.

Under the Bi-lateral Memorandum Agreement on Shellfish between the United States and Canada, the responsibility for administering a shellfish control program has been given to the Department of National Health and Welfare, and more specifically to this Division. This involves the operation of the complete shellfish program in the Atlantic Provinces and the certification of provincial programs in Quebec and British Columbia.

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(e) Activities Carried Out by Division

1. Water quality studies - Great Lakes
2. Evaluation of waste disposal systems serving federal establishments across Canada.
3. Approval of plans for waste treatment systems- federal establishments.
4. Water quality studies - Red, Rainy, and St. Croix Rivers.
5. Assessment of water supply sources and water treatment methods for use by federal agencies and common carriers.
6. Sanitary and bacteriological surveys of shellfish growing areas in the Maritimes. The Bacteriological Laboratories of the Division in Ottawa carry out a Paralytic Shellfish Poison Control Program through bio-assay tests on samples submitted.
7. Special studies related to water pollution at the request of Provincial and/or federal agencies.

e.g. 7.1 Assessment of Industrial wastes discharged to fresh waters in the Atlantic Provinces under the Atlantic Development Board program re financial grants to industries for abating pollution.

7.2 Studies were carried out to measure and control pollution in the waters surrounding the site of Expo-67 in Montreal Harbour.

7.3 Pilot plant studies are being conducted on potato and other food processing wastes in Prince Edward Island to determine treatment requirements.

- (d) The Division assists other International, Federal and Provincial agencies in preserving and improving the quality of fresh waters in Canada for the economic benefit of all regions. This includes the preservation of health which is the central aspect of the Division's work in pollution control.

(a) The Division has not been able to develop meaningful cost-benefit ratios as yet. These are particularly difficult to evolve where health preservation and disease prevention are concerned. Problems related to pollution control will generally be most critical in those regions where population and industrial growth are greatest.

Water quality studies on International and Provincial waters have stimulated the construction of waste treatment facilities to control and abate water pollution.

The paralytic shellfish poison control program has been effective in protecting the shellfish - consuming public from illness, and has permitted the exploitation of shellfish stocks which are seasonally toxic.

By classifying water sources and approving potable water systems, the Division has been instrumental in protecting the health of the travelling public who use international and inter-provincial common carriers.

12.2.1.3 Occupational Health Division - Distribution of Activities

There is no formal or uniform regional pattern of expenditure on scientific activities by this Division. Only intramural expenditures are made, and these vary according to specific requests made by provinces, industries, or federal agencies concerned with environmental or occupational health problems; e.g., industrial hygiene, pesticide toxicology, and air pollution.

Maritime Provinces and Northwest Territories demand greatest attention. Additional scientific activities are conducted at request of the International Joint Commission to investigate transboundary flow or air pollution.

Activities carried out during last five years include:

Special studies or investigations on behalf of the I. J. C. re transboundary flow of pollution in the St. Clair-Detroit River area;

Clinical and environmental studies of: (1) aerial spraying

of pesticides, New Brunswick; (2) arsenic pollution of environment in Northwest Territories; (3) lung cancer incidence in miners and communities, Newfoundland; (4) biological effects of asbestos in industrial and urban populations. The Occupational Health Division contributes to regional development through conduct of special investigations, provision of professional and technical services, development of monitoring programs, publication of technical information, and training of technical staff.

In those provinces and areas where the specialized scientific staff and facilities do not exist to deal with occupational and environmental health problems; the centralized service located in Ottawa provides the only access for these areas to this type of service. As mentioned in paragraph one no uniform pattern for expenditure and distribution of these scientific activities has been established on a regional basis.

12.2.2

Provincial Distribution of Arthropod and Rodent-Borne Disease Studies Carried Out By the Zoonoses Laboratory of the Laboratory of Hygiene.

12.2.2.1

Nova Scotia

This laboratory participated in 1964 with the Department of Health in a survey of cats and dogs as reservoirs of leptospirosis. Local veterinarians had expressed concern about the possibility of this disease being important to their practices and to the public who come into contact with these animals. It was found that 7% of the animals tested were positive. No human cases have been demonstrated.

Southwestern Nova Scotia has an extensive infestation of the American dog tick which is spreading northeastward. Studies by this laboratory carried out several years ago indicated that this tick, though a recognized vector of several diseases transmissible to man in the United States, was not infected with any disease agent of public health importance. Arrangements are being made for a serologic study of wild animals to determine the present disease status of this tick population.

12.2.2.2 Quebec

The selection of Montreal as the site for the 1967 World Fair brought into sharp focus the associated problems of poor sanitation and heavy rat infestation in the Montreal Harbour area. A task force, formed to deal with the situation, requested the Zoonoses Laboratory to conduct a study of diseases of public health importance possibly carried by the Montreal area rats. Studies in 1959 in that area by this laboratory had shown that the etiologic agent of leptospirosis occurred rather commonly. It is of interest that most of the human cases of leptospirosis recognized in Canada have been reported from Montreal. The presence of *Xenopsylla cheopis*, the most efficient vector among the several species of fleas which can transmit the bubonic plague, was also demonstrated. In the recent study, 2% of the rats were serologically positive for leptospirosis and 10% yielded leptospirae by culture. Four isolates of *Salmonella enteritidis* were also obtained from rats from the south shore of the Montreal Harbour.

12.2.2.3 Ontario

As a result of studies coordinated by the Zoonoses Laboratory, Q fever was shown to be present in dairy cattle in all provinces except the Atlantic Provinces. This laboratory then undertook a study in central Ontario using radioisotope serology to determine the extent of exposure of the human population. A very high incidence of either clinical or sub-clinical Q fever was found among farmers in contact with infected herds. The role of this disease in cases of atypical pneumonia, endocarditis and possibly hepatitis requires clarification particularly among dairy farmers.

A study on diseases in nature in the Richmond area near Ottawa led to the discovery that California encephalitis virus was circulating. Five isolates of the virus, the first in Canada, were obtained from rabbits. The public health importance of

this mosquito-borne disease has only recently been recognized in the United States and is yet to be determined in Canada. Human surveys for antibodies to this virus have been conducted in the Ottawa area and on Indian reserves in southwestern Ontario. The highest reactor rate (68%) was found in Indians on the reserves at Muncey. Human cases have been recognized on the American side of Lake Erie opposite Muncey. A public health study of this disease is now in progress on the Muncey reserves.

The Richmond study also led to the discovery that Rocky Mountain spotted fever rickettsia exists in ticks in Ontario despite the absence as yet of recognized human cases. Along with this micro-organism, a rickettsia new to health science was isolated from Richmond ticks. This microorganism named *Rickettsia canada* is very closely related to the rickettsiae causing endemic and epidemic typhus.

The American dog tick is a very common pest on southern Ontario Indian reserves. It has been found on these reserves to be a carrier of Rocky Mountain spotted fever and tularemia agents. Because of this and of the severe skin infections which may follow its bite, an extensive tick control investigation has been launched by this laboratory in cooperation with the Department of Indian Affairs and Northern Development. New pesticide combinations have been developed as short-term methods of tick control. Land cultivation with grain production has given excellent results as a long-term tick control measure and has the added advantage of encouraging Indians to put idle though fertile land into productive use.

12.2.2.4

Manitoba

The Atomic Energy of Canada community at Pinawa has made collections of ticks and forwarded them for disease studies. Rocky Mountain spotted fever rickettsia has been demonstrated in these ticks.

12.2.2.5

Saskatchewan

Assistance has been given to personnel who are studying the ecology and public health significance of western encephalitis. In excess of 36,000 mosquitoes collected in various areas of the province in 1965 and 20,000 mosquitoes collected in 1967 were processed by this laboratory for western encephalitis virus. Three viruses apparently new to the province have been isolated.

12.2.2.6

Alberta

For many years the Health Department of this province has made use of the skills of this laboratory to study rodent- and arthropod-borne diseases. Large numbers of mosquitoes, ticks and rodent and bird tissues have been studied for viral, rickettsial and bacterial disease organisms. Rocky Mountain spotted fever, plague and tularemia have been demonstrated and more recently two mosquito-borne viruses Turlock and Cache' Valley have been isolated. This is the first time that Cache' Valley virus has been isolated in Canada and the second time that Turlock virus has been found in this country.

12.2.2.7

British Columbia

A cooperative study with workers of the Canada Department of Agriculture led to the demonstration in 1965 and 1966 that spotted fever ticks in the southeastern corner of the province are infected with Colorado tick fever virus. This is highly infectious for humans and very high percentages of non-immune humans coming into areas in the United States where this virus exists have developed the disease. There is no apparent justification for assuming that the same result would not follow contact between infected ticks and non-immunes in Canada.

PART TWO

RESEARCH OUTPUT AND EXPENDITURES RELATED TO DEPARTMENTAL
SCIENTIFIC ACTIVITIES

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13.2.4.2

Selected Case Histories

The ANNEX, Volume II, contains selected case examples of projects undertaken in various branches of our Department. We have not chosen these necessarily as the best examples, instead they are representative, indicating in some instances the difficulties involved in reaching objectives when complex human behaviour and various publics are involved, e.g. the Smoking and Health Program, for which we have included a cost benefit analysis. In another instance several breakthroughs in our Laboratory of Hygiene are cited, in still another instance we note the impact on the Canadian drug market, protection of Canadians and the international recognition arising out of scientific activities in our Food and Drug Directorate. While a proper evaluative review of the benefits and impact of twenty years of the National Health Grants still awaits a systematic study in our department,¹ in this Brief we have selected one program, namely, Organized Home Care because we believe that the Grants played a major role in enabling the provinces, the voluntary agencies ready to undertake new responsibilities (mainly V.O.N.) in the organization of health care, and the pioneering physicians and health teams to experiment with a new delivery of care service. Organized Home Care is now a legitimate service; it is not confined to hospital patients or to medical indigents but has survived its development phase in the spectrum of health care services and in doing so established pioneer community health teams. Finally we cite briefly an example in Development, relating to prosthetic service.

¹ For publications reviewing the accomplishments of the National Health Grants Program see: National Health Grants 1948-1961, the Department, Jan. 1962.

D. M. Herron, B.A., M.P.H., "National Health Grants", Medical Services Journal, Canada, XXIII:9, Oct. 1967.

14.

EXPENDITURES RELATED TO DEPARTMENTAL SCIENTIFIC ACTIVITIES

The following Tables contain the expenditures and expenditure projects for scientific activities carried out or supported by the Department

<u>TITLE</u>	<u>TABLE NO</u>
- Intramural Research and Development, Scientific Data Collection and Scientific Information Costs	I
- Funds Expended in Support of Extramural Research and Development	II
- Funds Expended in Aid of Higher Education	III

Readers are alerted to the following in the interpretation of the Tables:

- (1) The 1967/68 figures in Tables I, II and III are estimates.
- (2) Actual figures for the year 1967/68, based on different terms of reference from those used for the prior years, and in the projections, were received too late for inclusion in this Brief. These latest figures will be submitted in a separate presentation as soon as they can be evaluated and prepared.
- (3) For the year 1962-63 costs of Research and Development and Data Collection are not available by Branch or Division.
- (4) Actual expenditures for the year 1967/68 were not available at date of preparation. Realistic estimates have been shown.
- (5) Separation of Grants to Universities from Grants to Other Agencies is not available for the period 1968/69.

DEPARTMENT OF NATIONAL HEALTH AND WELFARE
INTRAMURAL RESEARCH AND DEVELOPMENT, SCIENTIFIC DATA COLLECTION, AND SCIENTIFIC INFORMATION COSTS
(Dollars in Thousands)
FOR THE YEARS 1962/63 - 1967/68
(=Estimate)

TABLE I

	(1) 1962/63	1963/64	1964/65	1965/66	1966/67	(2) 1967/68 *
(A) Intramural R&D						
Health Services						
Emergency Health Services			3.5	3.8	3.8	9.5
Laboratory of Hygiene		266.9	322.9	390.0	435.8	466.9
Occupational Health		211.5	241.0	339.9	474.5	527.3
Radiation Protection		325.0	349.0	378.0	477.0	602.0
Nutrition		10.0	11.0	19.0	20.0 *	-
Public Health Engineering		5.2	6.1	13.0	13.0	132.0
Smoking and Health				18.0	3.0	3.0
Sub-Total		816.6	933.5	1,148.7	1,427.1	1,740.7
Food and Drug		565.0	806.0	1,268.0	1,632.0	2,947.0
Medical Services		152.0	159.0	159.0	177.0	188.0
Research and Statistics						
Sub-Total	330.2	353.0	409.0	478.0	552.0	576.0
Total Intramural Research and Development	2,128.4	1,888.6	2,307.5	3,053.7	3,788.1	5,451.7
(B) Data Collection						
Health Services						
Epidemiology		26.7	54.0	68.5	74.5	82.0
Mental Health		10.0	10.0	-	-	-
Dental Health		18.0	11.0	5.0	17.0	20.0
Medical Rehabilitation		0.7	0.7	0.8	31.0	47.0
Hospital Design Division		13.0	15.0	-	-	-
Health Insurance Division		40.0	60.0	-	-	-
Sub-Total		108.4	159.7	74.3	122.5	149.0
Health Insurance and Resources						
Health Facilities Design				20.1	45.5	77.6
Health Resources				100.0	130.0	195.0
Hospital Insurance and Diagnostic)						
Medical Care Insurance						
Sub-Total		-	-	120.1	175.5	272.6
Total Data Collection	130.9	108.4	150.7	194.4	298.0	421.6
(C) Scientific Information - Administration						
Communications						
Sub-Total	46.1	65.0	80.0	86.0	106.0	120.0

Table 11.

DEPARTMENT OF NATIONAL HEALTH AND WELFARE
FUNDS EXPENDED IN SUPPORT OF EXTRAMURAL RESEARCH AND DEVELOPMENT
FOR THE YEAR 1962/63 - 1967/68

(* Estimate)

	Estimated Total 1962-1968	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	Total Est. Administration Costs Included
HEALTH								
Public Health Research Grants								
Universities	13,099.5	2,237.6	1,982.1	2,127.5	1,924.4	2,285.6	2,542.3	237.2 *
Other	11,478.7	1,356.2	1,973.7	2,110.0	2,371.7	2,037.9	2,542.3	237.2 *
Sub-Total	24,578.2	3,593.8	3,955.8	4,237.5	4,296.1	4,323.5	4,171.5	445.8 *
Health Resources Fund	12,238.1	Instituted in 1966						
Mental Retardation Grant	152.1	Instituted in 1967						
Smoking Retardation Fund								
Universities	55.3	Instituted in 1964		12.5	22.6	5.5	14.7 *	
Other	105.5	Instituted in 1964		18.3	27.4	29.1	35.7 *	40.0 *
Sub-Total	160.8			30.8	50.0	29.6	50.4 *	40.0 *
Narcotic Addiction Grant	174.8	Instituted in 1968					174.8	
TOTAL HEALTH	37,304.0	3,593.8	3,955.8	4,268.3	4,346.1	6,514.4	14,625.6 *	495.1 *
WELFARE								
National Welfare Grants								
Universities	143.5	8.4	5.5	18.2	10.2	21.6	79.6 *	
Other	728.8	21.4	53.1	70.7	113.5	183.9	286.2 *	
Demonstration	536.4	Instituted in 1966				181.7	354.7 *	96.0 *
Sub-Total	1,408.7	29.8	58.6	88.9	123.7	387.2	720.5 *	96.0 *
Fitness and Amateur Sports Grants								
Universities	1,219.5	36.7	58.1	234.9	280.9	314.9	335.2	58.1 *
Other	128.5			19.3	11.2	38.8	18.0 *	
Sub-Total	1,348.0	36.7	58.1	254.2	292.1	353.7	353.2 *	58.1 *
Mental Retardation Grants								
Research	79.7	Instituted in 1967						
Demonstration	53.7	Instituted in 1967						
Sub-Total	133.4							
TOTAL WELFARE	2,890.1	66.5	116.7	343.1	415.8	740.9	1,207.1 *	154.1 *
	40,194.1	3,660.3	4,072.5	4,611.4	4,761.9	7,255.3	15,832.7	649.2 *

TABLE 1.1
DEPARTMENT OF NATIONAL HEALTH AND WELFARE
FUNDS EXPENDED IN AID OF HIGHER EDUCATION
FOR THE YEARS 1962/63 - 1967/68
(Dollars in Thousands)
(Estimate)

	Estimated Total 1962-1968	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	Total Est. Administration Costs Included
HEALTH								
Professional Training Grant	12,061.8	1,511.7	1,742.9	1,933.4	2,183.4	2,446.5	2,243.9*	
WELFARE								
Welfare Grants	525.8	10.9	60.6	40.5	89.7	156.6	167.5*	46.3*
Fitness and Amateur Sports Grants	1,015.6	71.4	142.5	170.1	215.4	197.5	218.7*	42.2*
TOTAL WELFARE	1,541.4	82.3	203.1	210.6	305.1	354.1	386.2*	88.5*
TOTAL DEPARTMENT	13,603.2	1,594.0	1,946.0	2,144.0	2,488.5	2,800.6	2,630.1*	88.5*

15. DEPARTMENTAL SCIENTIFIC ACTIVITIES COORDINATING MECHANISMS

15.1 Introduction

The sections describing the scientific activities of our Branches and divisions contain detailed references to coordinating mechanisms and the network of liaison established between these units and other agencies of the Federal Government, voluntary organizations including professional associations, universities, industry and provincial governments. Coordination of scientific activities both within the Department and with outside agencies is one of the primary goals of our administration. Our Department, large and complex, is involved in many and far-reaching programmes in the health and welfare fields, inevitably the task of securing coordinated action at the highest level is crucial to promote and insure efficient and effective action towards successful achievement of our departmental objectives.

This task is made even more complex in view of the fact that the attainment of these objectives involves effective coordination between health and welfare activities within the Department, in federal-provincial cost-shared programs, and within the jurisdiction of provincial authorities.

15.2 National Level

Our activities are in many instances interwoven with the national health and welfare agencies which play a prominent role, sometimes leading, sometimes complementing the activities of Government in the extension of science and the application of its fruits. Within the overall administrative structure of the Federal Government, this Department is deeply involved with other federal agencies either through shared jurisdiction and responsibility or for purposes of coordination of complementary or intersecting interests. While coordination takes place both at the Cabinet level of the forum of ministers and at the level of the Deputy Ministers on an overall basis, coordinating mechanisms are largely decentralized

allowing for the maximum of lateral consultation and cooperation permeating through all phases of the administration and operations of scientific activities. Thus, at the federal level, coordination and continuing liaison takes place with science based departments such as the Department of Mines and Resources, Atomic Energy of Canada, Fisheries, departments concerned with human resources such as Forestry, Manpower and Immigration, Indian Affairs, former Special Planning Secretariat, agencies mainly concerned with science such as the Science Council of Canada, Science Secretariat, National Research Council. Close cooperation is fostered with the Dominion Bureau of Statistics as the main data gathering agency. Close cooperation is fostered with other granting agencies such as the Defence Research Board, Department of Veterans Affairs and the Medical Research Council. Further rationalization of shared interests and clarification regarding allocation of responsibility should be expected to emerge through the present arrangement whereby this Department and the Medical Research Council report to one Minister. The Interdepartmental Committee of the Medical Research Council is an informal mechanism for the sharing of information. There is no authority requiring coordination of efforts, delineation of responsibilities in granting policies in the field of medical research. In the matter of standards we cooperate with the Specifications and Standards Branch of the Department of Trade and Commerce.

A tally sheet prepared in the process of our departmental survey exhibited a dense network of interaction with other federal agencies.

15.3

With Provinces

Our cooperation and coordination program with the provinces is achieved both at the national level and through a vast complex of committee structures with specialized objectives. See Section 11.2.4 Dominion Council of Health, pages 104 to 107.

15.4

With Voluntary Associations

The partnership between the voluntary associations and government anticipated by the Royal Commission on Health Services in the attainment of shared goals has in fact been deepened and strengthened over the past five years. Through our cost-sharing programmes with the provinces, a great many voluntary agencies have been able to strengthen their manpower resources and programs. Much work remains to be done in studying joint concern and optimal methods for achieving shared perspectives. The Department is now engaged in a study of national voluntary health organizations which is looking into this matter of partnership with levels of government, as well as other facets in the development of objectives and programs, the period following the publication of the covering Royal Commission on Health Services report to date in order to work out even more effective liaison for the future.

15.5

With Industry

The extent to which our scientific activities involve direct collaboration with industry is not as easily identified as such relations with the groups described above. The Food and Drug Directorate has extensive contacts with the pharmaceutical industry. Our Laboratory of Hygiene makes use of the Institute of Microbiology in Montreal and Connaught Laboratories in Toronto for the development of certain processes and products to assist our laboratories in carrying out their functions.

The Health Insurance and Resources Branch is employed in many consultative functions as well as functions relating to standards in various components of the health industry and the technologies related to it.

Information Services, in carrying out their functions must work closely with the communications industry. Relations with industry are also involved in the purchase and rental of electronics data processing equipment.

Occupational Health Division works closely with industry for study and control of working environment.

Special Committee

15.6 With International Agencies

The Department has been increasingly committed to international agencies particularly those associated with the United Nations and their scientific objectives and operations. Description of these responsibilities are also contained in the body of the Brief as reported by Branches and Divisions.

15.7 Communication of Scientific and Technical Information

Special attention is paid in the chapter dealing with communications and scientific and technical information (STINFO) regarding the present state for an organized system of coordination for this purpose. Our concern for the generation, storage and flow of knowledge brings us into close continuous interaction with the Universities and the library systems of this country.

15.8 Within the Department

This important phase of our overall department administrative process is achieved through the following mechanisms:

15.8.1 The basic role exercised by the Minister towards the coordination of research activities conducted in the health and welfare fields by the department. This activity is described in Section 11.1 of this Brief.

15.8.2 The coordinating activities performed by the Deputy ministers of National Health and Welfare either directly themselves or by staff officers who have delegated authority to that effect and act as liaison officers between the health and welfare organization of the Department on a continuing basis.

15.8.3 Departmental Health Studies Committee

Each Branch of the Department has a Research Committee. In addition there is a Departmental Health Studies Committee whose function it is to recommend policies and procedures for the coordination modification or assessment of surveys, studies, investigations, or research being supported financially or in other ways under all national health programs in the interest of a

rational consistent approach to meet the health responsibilities of the Department and to ensure the most effective and efficient use of public funds. The Committee reports to the Deputy Ministers of Health and to the Directors General immediately concerned.

The Committee is composed of officers designated by the Deputy Minister of National Health or by the Directors General on his behalf, and who are concerned with proposing, planning, conducting, negotiating, evaluating or recommending support for studies having a health component or aspect.

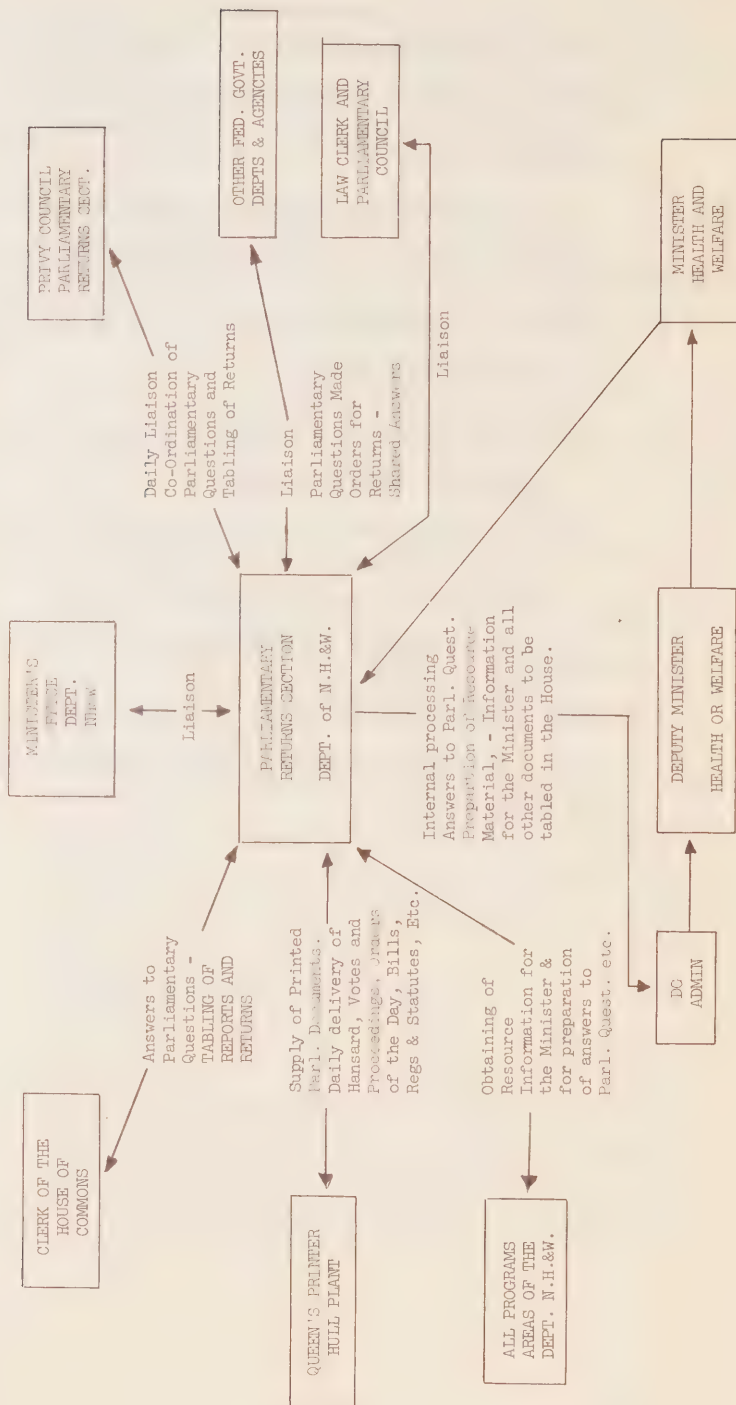
Its terms of reference specifically include:

- (a) the exchange of information of plans or ideas for study at as early a stage as possible,
- (b) the discussion of methods of financing or appraising the value and relevance to the health responsibilities of the department of any proposed study or study areas, and
- (c) seeking information from other departmental officers, or persons or agencies as required.

It is also hoped that the Committee would facilitate the development of a broader interdisciplinary approach to research, particularly in neglected areas.

PARLIAMENTARY RETURNS FUNCTION - DEPARTMENT OF NATIONAL HEALTH AND WELFARE

Office and Secretarial Services Division



PART THREE

PROBLEMS AND PRIORITIES AFFECTING PRESENT
AND FUTURE SCIENTIFIC ACTIVITIES

PART THREE

PROBLEMS AND PRIORITIES AFFECTING PRESENT
AND FUTURE SCIENTIFIC ACTIVITIES

16. INTRODUCTION

Timely and accurate definition of problems is essential to management to assess its ability to discharge its obligations towards meeting its objectives.

The purpose of this Section of the Brief is to explore and identify those areas in which problems of nationwide concern confronting us within the next five years, problems which may come within the responsibility of the Minister of National Health and Welfare or problems in which he may share an interest with other Ministers and may have a bearing on the scientific activities of the Department.

Actions taken to deal with some of these problems and programs designed to meet departmental objectives are also described.

16.1 Problems Arising From Changes in Physical Environment

The health and welfare problems considered in this section arise largely as a result of changes that are taking place in the physical environment. These changes involve industrialization and urbanization, population concentration, technological developments, and more rapid communications.

16.1.1 Environmental pollution

The physical environment has been broadly described as "the sum of all the external biological, chemical, and physical forces that surround man and therefore may influence his body processes or his behaviour". Environmental pollution may be construed as including those environmental factors or changes which unfavourably influence man's health and well-being. For many purposes attention is focused on physical and chemical factors. Most environmental pollution results from man's action and is a consequence of technological change and urbanization. These processes have been proceeding at an increasing rate so that the problems are growing in relative importance and urgency.

The sources of pollution have been variously classified but include:

(1) municipal sewage

- (2) urban solid wastes (including garbage, ashes, metal and glass, especially paper products, cans and bottles)
- (3) industrial and mining wastes, especially chemical effluents and slags
- (4) by-product or unintentional releases, especially from pesticide use and motor vehicle exhausts.

16.1.1.2

Applied research is indicated into the relationships between the working and living environment and the health of workers and of the general population, including particularly:

Occupational Health

1. The initiation of multiphasic epidemiological studies, in conjunction with environmental assessment studies, to determine the interrelationships between occupation, industry and/or general environment and the development of chronic diseases among certain defined population groups.
2. The development of diagnostic services and surveys in the industrial or community setting, directed towards the early detection and treatment of diseases.
3. The development and evaluation of specific physiological and/or biochemical (e.g., enzymic) methods for the assessment and medical control of human exposure to toxic substances.
4. The development of specific toxicological methods necessary to evaluate the safety and toxicity of toxic substances in the laboratory.
5. Studies on rehabilitation of physical and mental states resulting from conditions in the working environment.
6. The development and evaluation of methods of sampling, measurement, and analysis of toxic components and physical factors of the working environment and the assessment of the effects of such components and factors in relation to extent of exposure.
7. The development and evaluation of methods for protecting people at work from harmful environmental factors arising out of their employment; for example, temperature, humidity, noise, vibration, etc.
8. Studies of the cause and nature of fatigue.
9. Studies of sickness absenteeism and its cause.

10. The estimation of gaseous vapour or particulate contaminants in the atmosphere and the study of their effects on humans.

16.1.1.3

Air pollution - Air pollution comprises a serious health hazard in that people living and working in polluted regions may breathe in toxic substances; where pollution settles on soil or garden produce as "fallout" it may be indirectly absorbed through food. It must also be recognized that pollution creates a welfare hazard in that it contributes to the deterioration of the community, making it a socially undesirable environment in which to live. For some years the Occupational Health Division has had a consultant on air pollution questions who has been concerned with studying and providing advice on the health aspects of air pollution. As the pollution problem intensifies in Canada, legislative action at the federal level becomes essential. The Department of National Health and Welfare guards the health and social welfare of the people and is clearly involved in any efforts to control air pollution, where such control lies within federal jurisdiction.

In any case, the Department has the responsibility to investigate and promote research regarding the health effects of pollution, from the viewpoint of both the cumulative effect of chronic exposure, and the immediate effect of day-to-day exposure or of exposure to periodic smog episodes. Such research should also extend to the determination of the most effective techniques for monitoring pollution levels. Generally, the Department is expected to provide leadership to, and co-ordination with, the provinces and industry in the establishment of standards and guides and through the support of research into methods of assessing the effects of pollution.

Costs of pollution control will be of concern to both industry and government. Although the direct relationship of pollution to health effects may be difficult to determine, the best available evidence must dictate the establishment and review of guidelines for action in the face of generally increasing pollution levels. With respect to motor vehicle exhausts - probably the leading source of air pollution - the problem for

industry would seem to be the development of control devices or more efficient internal combustion engines, or alternative power supplies. The problem for government would be the conditions during the transition period, and its duration. Two specific current problems are the Department's commitments on behalf of the Government to the International Joint Commission respecting pollution in the Windsor-Detroit and Sarnia-Port Huron areas, and the development of a National Air Pollution Abatement Program to include a national sampling network, motor vehicle exhaust activities, and a national capital region study. In both instances, the immediate problem is one of availability of adequate resources for these tasks. A detailed description of the research activities conducted by the Occupational Health Division of this Department appears in Section 11.4.15 of this Brief.

16.1.1.4

Water pollution

There can be no doubt that the Department's responsibility for safeguarding the health of the Canadian people extends to measures for the control of water pollution. Indeed, the World Health Organization makes clean water supplies its number one priority, since pollution from this source outweighs all other sources as a health hazard.

Major organic pollution exists everywhere across Canada, and much raw sewage is still being dumped into water resources. Industrial pollution is proceeding rapidly as industrialization extends into all parts of Canada. There is increasing evidence of the presence of toxic substances from agriculture and industry picked up by micro organisms in water supplies and carried through the food chain of marine life to affect the edibility of fish, mollusks, lobsters, etc.

For a number of years the Public Health Engineering Division has worked closely on water pollution questions with the Water Resources Branch of the Department of Energy, Mines and Resources who have been assigned the co-ordinating role in this regard. The National Health and Welfare Act specifically mentions as the Minister's responsibility the enforcement of rules made by the International Joint Commission concerning boundary waters so far as they relate

to public health. It must be recognized, however, that there are economic as well as health questions involved in the water pollution problem -- relating to the fishing industry, the tourist industry, and the industrial uses of water -- which lie outside the scope of this Department's responsibility. On the other hand, it appears to be within the Minister's responsibility to investigate the social implications of water management, research recommended by the Science Council of Canada. They urge the need for some objective method of judging the social and esthetic value of a resource, and what the effects of altering it will be on the people of the region. In this sense, water management programs are in the same category as regional development and urban renewal programs -- each has a social impact on the people affected which should be investigated.

At present, the Public Health Engineering and the Radiation Protection Divisions monitor marine life and water supplies for health hazards. The Food and Drug Directorate monitors food for the presence of pesticides. The Occupational Health Division monitors industrial activity for the control of industrial effluents through selected studies.

The major problem area of water quality maintenance, involving especially the effective control of municipal sewage, although primarily a question for provincial jurisdiction in any given instance, is receiving federal attention at least from the standpoint of standards and methods.

A more detailed description of current research activities conducted in this field by the Public Health Engineering Division appears in section 11.4.15 of this Brief.

16.1.1.4.1

Research is indicated in the following areas:

A. Water Supply and Water Treatment

1. Develop economical processes for treatment of highly mineralized water supplies, particularly for individual or institutional systems.
2. Improve sewage treatment procedures to provide more effective and economical treatment than that presently accomplished.

3. Develop cold water treatment methods applicable to northern conditions and thereby reduce high cost factor resulting from necessity to heat water prior to treatment.
4. Develop treatment processes for industrial wastes from manufacture of complex organic chemicals.

E. Water Quality and Control (Microbiological, Chemical and Physical Studies)

1. Development of Canadian Standards for Potable Water

- (a) Establish limits, based on investigation, for sodium, sulphate, arsenic and total dissolved solids in drinking water.
- (b) Develop analytical methods for the identification and determination in water of pesticides, algicides and organic chemical constituents contributed to water courses by industry.
- (c) Determine toxicity limits in water for pesticides, algicides, chemical fertilizers and other organic chemical constituents.
- (d) Coliform Indices of Pollution. In recent years increased emphasis has been placed on the estimation of Escherichia coli densities as an index of public health hazard in water and shellfish. There is, however, a decided divergence of opinion as to the significance of other coliform biotypes as indices of pollution. In stream pollution and shellfish growing area investigations, the interpretation of coliform and E. coli density data may be particularly difficult when the picture is complicated by heavy rainfall induced run-off. Further studies of the "faecality" of the various coliform biotypes, their relative incidence under varying conditions, and their validity as indices of health hazard, are definitely required.
- (e) Coliform MPN: MF Relationships. The membrane filter (MF) technique is now the method of choice in many laboratories for the routine determination of coliform densities in water supplies; in these laboratories the MF method has replaced the older

tube-dilution (MPN) procedure, even though very few attempts have been made to correlate the coliform density data obtained by the two tests. The comparative data available indicate that the two tests do not measure precisely the same coliform spectrum, and that the relative productivity of the two tests depends on a multiplicity of factors including meteorological factors the type of pollution present and the incidence of aberrant coliform and coliform-like biotypes in the specimen. Further study of the relationship between the two test procedures, and the development of improved MF media, are needed.

- (f) Water Sample Shipment and Storage. Many Canadian sanitary bacteriology laboratories serve large geographical areas; inevitably, a significant proportion of the water samples submitted to these laboratories have been in transit, with or without refrigeration, for a considerable period of time. There is a paucity of information on the bacteriological effects of such storage, and on the degree of confidence which may be placed on coliform data derived from aged water samples; further study would be desirable.

2. Taste, Odour and Colour

- (a) Identify taste and odour producing algae types; devise on-site control methods through safe use of algicides and/or develop water treatment process for removal of taste and odour originating from algae.
- (b) Identify constituents other than algae that produce taste and odour in water supplies. Develop control procedures applicable at source or through treatment plant operations.
- (c) Investigate the use of potassium permanganate for removal of taste and odour and colour in water supplies,

C. Environmental Factors Having Health Significance, such as Water
Supply, Sewage and Waste Disposal: Insect and Rodent Control,
Ventilation and Sanitary Design of Equipment

1. Determine extent of water-borne virus problem.
2. Investigate ground water pollution originating from sewage lagoons and subdivision sub-surface effluent disposal fields.
3. Assess pesticide and other chemical control programs relative to actual or potential sources of water pollution.
4. Develop safe insect control measures for restaurants, hospitals, and institutions.

D. Microbiological and Virus Studies in Relation to Disease Potentials

Investigate the use of indicator organisms other than E. coli as a measure of pool water quality.

16.1.1.5 Exposure to radiation

Since the end of the war the health hazards of exposure to ionizing radiation has increased from several sources. Detonation of thermonuclear devices has caused extensive fallout of radio-active materials which may be absorbed from water, soil, or air, or indirectly through milk and other foods. Close continuous monitoring coordinated internationally is required to ensure that no significant health hazards develop. A detailed description of the research activities conducted by the Radiation Protection Division of this Department appears in Section 11.4.14 of this Brief.

16.1.1.5.1 New Techniques for Assessing Radiation Exposure and Its Effects on Health

Technological advances in the use of radiation sources and in related instrumentation are occurring rapidly. These are matched by increasing biological studies of the effects of exposure to ionizing radiations. In order to be able to maintain the same high level of health and safety in the use of radiation sources in Canada it is necessary for the Department's radiation protection activities to include provision for the investigation of present and foreseeable problems in the radiation protection and related bio-medical fields. For example, it is important for the Department to maintain and develop projects to assess new techniques and instruments, with special reference to their application to the radiation protection field. The use of radioactive isotopes in medicine, industry and research in Canada is continuing to grow, with an increasing number of larger sources for radiography and irradiation purposes. The risk of accidental radiation exposure increases more rapidly

than would be indicated by the number of sources alone - time and environmental factors will result in the gradual deterioration of older sources, producing potentially hazardous situations. There is an urgent need therefore to extend related health services and to develop more sophisticated techniques for early detection of radiation accidents.

In addition, there is a need to conduct research and development projects with special reference to the requirements for improved medical and biological data in assessing the significance of human exposure to harmful radiations. Because of individual variability, data contained in planning guides have only limited application to specific medical and health evaluations of individuals exposed to significant amounts of radiation. Detailed studies are necessary, for example, of the metabolism of specific nuclides in humans in order to be able to make health and medical recommendations in specific cases. Similarly, while personnel dosimetry services provide an important indicator of radiation dose, the actual damage caused will vary from person-to-person. There is urgent need therefore to continue the development of a biological method for assessing the radiation dose received and, ultimately, the consequences of that dose.

16.1.1.5.2 The Department supports research relating to ionizing radiation. Emphasis is given to improvements of methods, to preventive measures, and to certain therapeutic procedures, especially related to the following:

1. Methods to assess the radiation exposure resulting from specific radiation environments:
 - (a) environmental factors;
 - (b) dosimetry;
 - (c) human physiology.
2. Development and evaluation of methods and criteria for assessing the long term health effects of exposure to radiation:

- (a) recovery and non-recovery;
- (b) dose-rate, dose-distribution;
- (c) interdependence of radiation and factors such as nutrition, infection, temperature, chemical agents, etc.

3. Epidemiology of radiation-related injuries.

4. Methods for the reduction of radiation exposure.

16.1.1.6

Accidents and Safety Promotion

In terms of life years lost and working years lost, accidents are by far the leading cause of loss of potential life in this country because so many young persons are affected. It has been estimated that as a result of accidents, poisonings and violence, the man years lost in 1961 were 260,000. The days lost adjusted to 1967 would be nearly 75 million with an estimated wage loss of \$750 million. A recently released WHO report places Canada at the top of the list of twenty-four countries for numbers of persons killed or injured by accident per 100,000 population.

The leading causes of accidental deaths are traffic accidents. In 1966 these represented 46% of all accidental death and about half the deaths occurred in persons under 25 years. In Canada in each year about 5,000 people are killed from traffic mishaps, 1,600 from falls, 800 from drowning and 400 from poisonings. Of these in 1967, 67% were due to drug and solvents and 31% due to gasses and vapours. Next to traffic accidents the home accounts for most of the fatal accidents as a place of occurrence. Of the 5,757 non-transport accident fatalities, 2,199 or 38% occurred in the home. Falls, fire and explosion, suffocation and poisoning accounted for 1,920 or 87% of home fatalities. The 70 and over age group accounted for most of the falls. The 1 to 4 age group for 1% of fatalities due to fire and explosion. Infants for 72% of the suffocation and the 30 to 39 year age group for 37% of the poisoning.

Provincial hospital statistics for 1965 indicate that there were over 275,000 persons treated in hospitals for fractures, wounds, burns and poisonings from all causes. These patients required over three million days of hospital care. At current costs for hospital care, the total for such treatment is in the range of 100 million dollars.

16.1.1.6.1

Departmental Activities

Our Department has supported the Canadian Highway Safety Council* since its formation in 1955. In addition, our Epidemiology Division assists Council staff with technical and consultant service wherever possible. Financial support and consultation are also given to the newer Traffic Injury Research Foundation which stimulates and coordinates research. Our activities in the field of Poison Control are described in Section 11.7.2.2.1.1 of this Brief.

The Department has assisted research into traffic accidents in several ways:

1. Intramural studies. Epidemiological analyses of traffic accident statistics is undertaken to determine the nature and causation of injuries and to identify the susceptible groups involved.
2. Support of Extramural research. Through the Public Health Grant Program, the Department supports deserving research projects such as that carried out on childhood pedestrian accidents in the city of Vancouver.
3. Consultation. Departmental officers have acted as members of the Canadian Standards Association Committee on seat belts. This committee has developed standards currently in use in Canada. At present, departmental officers are engaged in assisting the Department of Industry in the development of Automotive Vehicle Safety Code which will deal primarily with

* Now renamed Canada Safety Council

Special Committee

specifications for safety design features for Federal Government vehicles but will also have sections dealing with the human factor and the environment.

4. Liaison

The Department is represented on the Canadian Medical Association Committee on medical aspects of traffic accidents. The Department also maintains liaison with the comparable group in the United States, the committee on Medical Aspects of Automotive Safety of the American Medical Association. These groups are particularly concerned with the development of Medical Standards for Fitness to Drive.

A strong case can be made for intensified (departmental) activity in the field of safety promotion and accident prevention. In addition to the conduct and stimulation of research, a major thrust, because the group at greatest risk is in the younger age groups, should be in the development of health education programs planned in cooperation with the national agencies concerned and provincial departments of health.

We might be more closely involved in the understanding and control of the environment, physical, social and cultural, not just exhorting persons to change their habits. Inducements to smoke, drink excessively, drive unsafely, abuse drugs, etc. are part of the cultural milieu arising out of technological advances.

5. More specifically, accident prevention studies are needed to throw further light on the interactions between man and his environment which may accidentally injure man, and with those conditions which lead to such interactions or which result from them (including emergency care).

These projects might include studies concerned with:

- A. The Characteristics of the Host or human population at risk such as:

(1) Characteristics associated with age

Studies have shown a high frequency of traffic accidents among young people. This has led to formal driver training as a preventive program to counter immaturity and inexperience which underlie the high accident rates. Their effectiveness has not been fully studied.

(2) Unusual Individual Susceptibility

Attempts should be made to identify personality characteristics associated with repeated accidents, and those for which the individual is primarily responsible.

(3) Factors Affecting Behaviour

(a) Drugs and Alcohol

Attitudes and motivation may be influenced by relatively small doses of a large number of substances. It is important to know if persons should refrain from certain activities after ingestion of some drugs.

(b) Physical Defects and Disease Processes

Factual information is needed to define what effects these factors have. Reduced alertness, faulty sensorium, impaired co-ordination, disturbed balance may contribute to hazardous situations.

4. Personal and Social Adjustments

Why are accident repeaters more likely to be known to such agencies as courts, credit organizations, V.D. clinics and welfare agencies than matched accident-free subjects?

What factors led to a person being involved in an accident?

B. The Characteristics of the Agent Causing Injury:

Studies on the nature of dangerous properties of agents have led to relatively simple preventive measures such as putting mechanical guards on power saws, the use of non-inflammable

material in children's clothing, recessing the hubs of steering wheels to prevent chest injury during impact. Analysis of equipment in the interests of safety requires a survey of responses to be performed, the layout of the working area, the location of controls and instruments and the way the operator is to carry out his functions.

C. The Characteristics of the Environment:

Methods are needed to analyze many factors in the environment which may influence accident involvement.

(1) The Physical Environment

Studies have revealed hazards resulting in falls in the home, and have lead to preventive measures such as non-skidding rugs, barriers at the head of stairways, and hand rails. What other measures might be useful?

(2) Illumination

Studies are necessary to determine the need for accurate perception of small details in both home and industry and the desirable intensity of illumination.

(3) Atmospheric Variables

A study of industrial accidents showed an increase in mishaps when temperature fell below 60° F. or when it rose about 75° F. What influence can be found in human performance from other changes in atmospheric and climatic variables?

(4) Toxic Agents

For example the effects of carbon monoxide have been shown to be an accident hazard due to lowered attention, difficulty in concentration, slight muscular inco-ordination. The blood of a person who has been smoking excessively may contain 5 to 8 per cent carboxyhemoglobin - sufficient to reduce night vision significantly.

(5) Studies of the social environment can reveal important relationships such as finding that lead poisoning among

children residing in low-income neighbourhoods frequently involves play around houses with cracked and peeling paint. The attitudes of the family play a role in the way children recognize, assess and behave toward hazardous situations. Industrial studies suggest that the psychologic climate influences the relative frequencies of accidents.

16.1.1.7 Housing problems

Two aspects of today's housing shortage are of particular concern to the Department -- the high cost of housing in proportion to the low-income family's budget and size, and the resultant tendency towards overcrowding in sub-standard housing. The former gives rise to pressures for increased levels of benefits under the various social security and social assistance programs financed by the Department. It also complicates any proposals to establish some guaranteed minimum level of income for various segments of the population.

Special housing arrangements for the aged and disabled have of course long been of particular interest to the Department although it has not been in a position to do more than encourage community efforts in this direction and cooperate with Central Mortgage and Housing Corporation upon request.

The second aspect - the tendency to over-crowding, creates obvious problems from both a health and a welfare viewpoint. Public health considerations - sewage and waste disposal, and communicable disease control - are of concern to both Public Health Engineering and Epidemiology, Child and maternal health and mental health are also indirectly concerned. Welfare considerations - juvenile delinquency, desertions and dependency, child welfare, family disintegration - are of concern to the Welfare Assistance and Services Branch insofar as they create pressures on the Canada Assistance Plan.

A third aspect in which the Department has an interest is the question of the recreation facilities that are, or should be, provided in modern housing developments. This question is crucial to the solution of the social adjustment problems associated with urbanization. Further investigation is needed to identify all the health and welfare hazards associated with inadequate housing, and to determine new approaches to the solution of these problems. Although Central Mortgage and Housing Corporation obviously has the responsibility for coordinating activities and interests in the housing field at the federal level, nonetheless, the Department has an important interest in certain aspects of the housing problem.

A recent departmental review of health in relation to housing indicates a need for renewed interest in housing by health departments. A man's home is the core of his environment and, from the health viewpoint, inseparable from it. The quality of the home should be central in our thinking about the promotion and preservation of health. Housing constitutes an important facet of personal and environmental health services and policies regarding housing must be coordinated with policies for other aspects of the environment.

The Department of National Health and Welfare proposes to extend activities in the field of housing and health along the following lines:

- (1) Recognizing that housing is an important facet of personal and environmental health services;
- (2) Encouraging Canadian health workers to participate in planning for land use and for new housing as well as evaluation of the adequacy of existing housing;
- (3) Stimulating nation-wide recognition that planning for housing should include health and ancillary services and not just the physical aspects of housing;

- (4) Creating enlightened public opinion regarding the environment-poverty-health association through Departmental health information and education programs. This would include such subjects as housing, pollution land use and resource conservation.
- (5) Examining Canadian housing standards to ensure that they meet modern health needs and developing new standards if necessary.
- (6) Developing indicators for housing-health relationships to assist in the development of health criteria, in the setting of goals and in the evaluation of effectiveness and efficiency in achieving these goals.
- (7) Promoting research into housing-health relationships.

The following are the priorities for improving environment:

- (1) The replacement of unsafe and unhygienic housing and the reduction of crowding and lack of privacy in pockets of rural poverty as well as urban slums.
- (2) Reducing accidents in the home and neighbourhood. These take a particular toll of the very young and the old and demand the incorporation of protective features into housing, roads and recreational areas.
- (3) Control of noise and pollution.
- (4) The incorporation of safety and livability features needed for the aged and handicapped into all housing to make it multi-purpose.
- (5) Introduction of experimental facilities for exercise and recreation into housing projects to learn more about housing-health relationships, especially with respect to mental and chronic degenerative diseases, alcoholism and drug abuse.

More information is needed for administrative purposes as well as to determine etiological relationships between health and housing.

The major requirements are:

- (1) Surveys of housing adequacy as related to health.
- (2) Surveys of the numbers of aged, handicapped and chronically ill.
- (3) Local surveys of mortality and morbidity to pinpoint blocks and districts needing special attention.

- (4) Surveys of public knowledge, attitudes and opinions regarding housing and the total environment to obtain the feedback essential to good planning.

16.1.2 Problems Arising from Changes in Social Environment

The problems considered in this section stem largely from the fact that the social environment is changing, and in the process is engendering a number of serious health or welfare problems. These changes involve industrialization and urbanization, breakdown in traditional patterns of family life and shifts in community responsibilities.

16.1.2.1 Use of new drugs

Technological developments in the pharmaceutical industry result in the offering of new drug products on the market at an ever-increasing rate. The Department of National Health and Welfare is concerned in two aspects of this process. Through its statutory obligation for preserving the health of the Canadian people, it has the responsibility for ensuring, to the extent possible,

- (1) that new drugs are safe to use
- (2) that they conform to the health standards established by the Department.

Through this responsibility for preserving both the welfare and the health of the public, the Department also has the responsibility to warn the public against the dangers of abuse of these drugs. Even though they do not fall within the category of narcotic drugs, certain drugs or chemical compounds, if taken indiscreetly, or without proper medical supervision, may have serious effects on a person's health, personality, and economic independence. They may also affect unborn children as we learned from the thalidomide tragedy. Where cause and effect are known, the Department's responsibility includes educational campaigns on the dangers of abuse or to the development of new control measures to protect the public.

16.1.2.2 Foods, Drugs and Hazardous Substances

This Department has long had responsibility for the control of food and drugs in Canada, to ensure that foods are pure and wholesome and drugs are safe and effective. Activities directed to these objectives include licensing, inspection, establishing standards, control of drug manufacture and distribution of samples,

specification of drugs to be sold only on prescription, the evaluation of new drugs, specification of food additives, the control of proprietary or patent medicines, and the control of the sale, distribution, and possession of narcotics.

Technological changes during the last few years has had a marked impact on the Department's involvement in the above indicated areas. Changing consumer preferences and the marked increase in use of highly processed convenience foods have markedly increased the numbers of chemicals added to foods. Over 450 different chemicals now may be added to foods for various technological reasons, and the number is expected to continue to increase. Problems related to the safety of food additives will therefore continue to be of concern to the Department. Technology also is altering the long-standing problems of microbial contamination of foods. For example, increased international trade may result in introduction into Canada of food borne diseases from tropical countries. This will require increased surveillance and research activities. Problems related to the monitoring of the drugs on the Canadian market and to the evaluation of new drugs, will continue to be of major importance to the Department. They pertain to the ability of the Food and Drug Directorate to provide adequate protection to the public in the face of the ever-changing and complex problems arising from the development of new and potent drugs. The problem is made more formidable by its sheer magnitude and technical complexity. The problem of adequate protection may become more acute if the proposed amendments to the Patent and Trade Marks Act result in a substantial increase in drug imports. The use of automated equipment to provide improved capability to analyze large numbers of drugs will have to be investigated.

The increasingly apparent need to provide the medical professions with objective information regarding the actions of drugs will give rise to major problems. Provision of the information bulletin which was recommended for this purpose by the Harley Committee will require appropriate planning and provision of additional resources. These include adequate research contract funds for clinical trials of drugs.

Particular mention should be made of the legislative proposals respecting hazardous substances introduced in the last session of Parliament. Although it is understood that the Department of Consumer and Corporate Affairs will administer the legislation, the Food and Drug Directorate of this Department will still be required to provide analytical and research services and scientific advice on medical and toxicological aspects. Matters of co-ordination between departments and co-operation with interested agencies or organizations, with respect to such subjects as uniform standards, the provision of information and statistical data, especially in relation to hazardous substances, adverse drug reactions, and poison control, will need careful attention and additional resources during the coming years.

16.1.2.3

Drug Abuse

Special mention should be made of the problems that can arise from the improper use of certain classes of drugs. There is a considerable body of literature on this question, particularly on the use of LSD and marijuana or combinations of these and other drugs, but there are conflicting opinions on the extent or permanence of the damage done by the abuse of these drugs. Nonetheless, the subject is one of widespread concern at the present time, and one in which the Department is actively engaged with. Even though they do not fall within the category of hallucinogens, certain other drugs or chemical compounds, if taken indiscriminately without proper medical supervision, also may have serious effects on a person's health, personality, and economic independence. In this respect again the Department's responsibility extend to further research and education on the dangers of abuse, or to the development of new control measures to protect the public. Some of the problem is sociological, and societal changes will be required for its eventual solution.

16.1.2.4

Alcoholism

The recognition of alcoholism as a health problem is fairly recent and with the conceptual shift to the health aspects of alcoholism rather than the moral aspects of drunkenness a scientific approach

to the prevention and control of alcoholism is possible. Estimates of the dimension of the problem vary; an off-quoted figure is that 23 out of every 1000 Canadians, 20 years and over are affected. We know that 1,354 deaths in Canada in 1966 were attributable to cirrhosis of the liver. While all provinces have initiated provincial alcoholism programs of varying scope and emphasis, the prevention, control and rehabilitation of alcoholism will depend on:

- (1) Increased interdisciplinary research into the distribution and causation as well as,
- (2) Improved services on behalf of known alcoholics and their families, and
- (3) The co-ordination of efforts of the interested voluntary organizations and governments.

Our department allocates \$15,000 per annum to The Canadian Foundation on Alcoholism, a co-ordination body with responsibilities for developing a research conference program.

16.1.3

Preventive and Social Medicine

The whole question of a balanced spectrum of service from primary prevention to rehabilitation will require more attention in the next few years. In fact, already the lines are blurring between the traditional divisions of preventive medicine, Public Health and clinical therapeutic care in the hospital and in the community. In fact there is considerable discussion about re-definition of the terms 'preventive medicine', 'social medicine', 'public health' and 'community health'. Allocation of resources to the development of vaccines, to the evaluation and support to multiphasic screening and immunization programs, and to disease eradication that is now becoming feasible merits consideration in the face of the compelling demands for facilities and staff for treatment services, if the Department is to discharge its responsibilities for the prevention and promotion of health in Canada. While there are many problems to be solved in how best to carry out programs in preventive and social medicine, the big need is for the application of what is already known, e.g., it is now possible to consider and plan for the eradication of some diseases, such as tuberculosis. The resources needed for the

attainment of such a goal make the decision regarding this rest on the order of health priorities.

Innovative programs for the teaching of social and preventive medicine are taking shape in Canada's health science complexes¹ and there is ample evidence that at least some of the students of today are prepared to devote as much attention to these subjects as they have in the past to the clinical specialties.

16.1.3.1

Major chronic diseases and the life cycle

Significant advances in the prevention and care of communicable diseases in the past generation as well as effective reduction of infant and maternal deaths due to complications of birth and delivery have profoundly altered life expectancy. At each stage of the life cycle however, there are risks. From birth to the end of adolescence, there are conditions such as congenital malformations or defects, retardation or deficiency in mental, physical or social development due to genetic or environmental factors or combination of both. Health hazards in early adult life include mainly death or injury from accidents or violence or the incipient stages of chronic diseases such as rheumatoid arthritis or multiple sclerosis or of mental illness.

Health problems in middle and late life are mainly cardiovascular diseases, cancer, cerebrovascular accidents (stroke) diseases of locomotion such as arthritis and rheumatism and mental illness and as we have increasing numbers of Canadians in very advanced old age, the infirmities associated with this.

16.1.3.1.1

Research is indicated in the following areas with a view to evaluation and further improvements in care.

1. Specific protection - ways of preventing the occurrence of chronic disease and disability, e.g. retrolental fibroplasia in infants, standards for operators of motor vehicles.

¹ See Science Forum 1:2, Apr. 1968 "Health Sciences Centres: Revolution in the Health Professions", pp. 15, 16.

2. Early diagnosis and prompt treatment - case-finding measures, such as screening tests and selective examinations.
3. Disability limitation - effective ways to arrest disease progress and minimize disability.
4. Rehabilitation - appropriate ways and techniques for medical and allied assistance in the return of patients to maximum potential usefulness in the community.
5. Studies of needs for various types of service to prevent or minimize chronic disease or disability.
6. Study of existing services respecting chronic disease and disability; evaluation of their efficient use; and study of effective ways to ensure progressive patient care as needed.
7. Studies directed to determination of the extent of chronic disease and disability in the community, e.g. incidence and prevalence of diabetes, congenital anomalies, and classification of cases according to needs for care and related services.
8. Epidemiological studies to determine important factors in the appearance and progression of chronic diseases and disability.
9. Studies of attitudes and motivations of the general population, the aged, and the chronically ill, in relation to community services for diagnosis and treatment.

16.1.3.2

Cardiovascular Diseases

About 40 percent of all deaths in Canada are accounted for by diseases of the heart and blood vessels, cardiovascular diseases which comprise a group of conditions of diverse etiology grouped together because they affect principally one organ system. Renal disease (generally chronic nephritis) is also linked with cardiovascular disease. These diseases are known as the greatest killers in western society. Within this broad category there are marked trend differences for different diseases. Deaths due to rheumatic fever and rheumatic heart disease declined with improved standards of living, improved control procedures, as with other bacterial diseases, with developments in chemotherapy. Mortality from hypertension has also been reduced. Death due to arteriosclerotic diseases are mainly

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in the old age group. .Coronary heart disease strikes mainly males in the prime of life and is therefore a major threat to health and survival. In the 45-54 year group the excess deaths of males are five times as frequent as deaths of females. Departmental contribution to the control of cardiovascular diseases has taken a number of directions. The introduction of Hospital Insurance was, of course, a major factor in providing access to hospital care to virtually all Canadians, when Hospital Insurance became available to residents of all provinces and territories, by January 1961 with the inauguration of the program in Quebec. In 1961 hospitalization, expressed in separation rates was 50 percent higher than in 1951. Through the National Health Grants Programs, inaugurated in 1948, provinces were assisted, prior to the introduction of Hospital Insurance with the purchase of heart-lung pumps in order to make open heart surgery available for the benefit of patients mainly with valvular lesions of congenital or acquired origin. Since 1948 Health Grants have given assistance to research in, among other, anesthesia in cardiac cases, blood changes in atherosclerosis, cholesterol metabolism, low cholesterol diet, coagulation of the blood in cardiac and renal diseases, diagnosis of atherosclerosis, electrolyte balance in heart failure, prevention and treatment of rheumatic heart disease, spread of heart sounds in the chest and the use of radioisotopes in heart disease. As means of preventing and arresting certain forms of heart disease, grants have been given to British Columbia, Alberta and New Brunswick for the purchase of sulpha drugs and penicillin for the prevention and control of rheumatic fever; this, together with generally improved social conditions, have been a factor in the above-noted reduction of protracted illness and early deaths as a result of these diseases which occurred mainly in lower socio-economic groups. Thus, under the National Health Grants Program for the year 1967-68, 15 research projects for inquiring into diseases of the circulatory system were approved for an amount of \$235,696. representing 5.5% of the total approved for projects under the National Health Grants Program. There has been a notable de-

crease in requests for research funds from our department as M.R.C. budget increased greatly, greater consideration was given by them to support of clinical research.

16.1.3.3

Stroke

Vascular lesions of the central nervous system are the third most frequent cause of death in Canada, as in most advanced industrial countries.

In 1966, there were 15,658 deaths in Canada attributable to this cause, almost equally divided between males (7,539) and females (8,119) but exceeded by the latter. While some 3/4 of these deaths occurred in the old (65 plus) and very old (75 plus) 2,157 deaths occurred in the 45-64 year olds, that is middle-aged Canadians. While the overall deaths in absolute numbers have remained fairly static, the death rate has been declining in the over 50 age group since the late 1950's on this continent. Nevertheless, these excess deaths are still a matter of concern to health authorities since at least some of the morbidity is considered preventable and much of the mortality can be effectively delayed by the timely application of therapeutic rehabilitative and extended care measures.

Epidemiological studies have revealed seasonal and geographic difficulties in mortality.¹ Further studies are required examining both the morbidity and mortality patterns, comparisons of environmental factors, diagnostic and therapeutic techniques and facilities, as well as the personal and health characteristics of those who become ill and the intervals between diagnosis of illness and death in order to arrive at suitable inferences regarding these statistical geographic variations.

16.1.3.4

Cancer

It is the second most common cause of death in all Canadian provinces, and in 1966 deaths from cancer numbered 26,848 or 17.9% of all deaths.

¹ P.C. Gordon, "The Epidemiology of Cerebral Vascular Disease in Canada: An Analyses of Mortality Data", C.M.A.J., 95:20, November 1966.

16.1.3.4.1 Cancer Control activities in Canada date back to the early 30's when growing concern was expressed by Provincial Medical Associations and provincial governments over the increasing number of reported deaths from cancer as well as the burden of suffering and costs to patients and families. Federal impetus was provided in 1948 when the National Health Grants programme was established and included under the Cancer Control Grant a sum of approximately \$3,600,000 available annually to the provinces on a matching basis for Cancer Control Programs. A year before the establishment of the National Cancer Institute was established arising out of a Conference on cancer organized by the Minister of National Health and Welfare for representatives from interested agencies to consider those aspects of the cancer problem which were in most need of development and assistance. The second development which played a large part in the control of cancer was the provision of Standard Hospital Care and Diagnostic Laboratory and Radiological Services as insured services under the Hospital Insurance and Diagnostic Services Act of 1957. This not only removed much of the burden of the high cost of treatment, it also enabled hospitals throughout Canada to make available Diagnostic and Treatment Services. In 1965 there were 172,203 operations and more than three and a quarter million hospital days attributed to neoplasms. Since early detection is a recognized method of controlling morbidity and reducing the toll of mortality from several types of cancer, cancer agencies aided by the National Health Grants in most provinces have taken steps to provide free diagnostic tests for patients examined in out-patients clinics and in doctor's offices.

At the beginning of this century, few cancer patients had any hope of cure. Before the Second World War, the five-year survival rate was about 1 in 5. In the immediate post-war period it was 1 in 4. Currently the figure is better than 1 in 3, thanks to the remarkable growth of the body of knowledge on

Knowledge is sufficient today in some areas of cancer chemotherapy, radiotherapy virus causation and chemical carcinogenesis to permit formulation of planned targeted research programs.

16.1.3.4.2

Research needs

As long as the problem of the etiology of cancer remains unsolved, fundamental research must be pursued with vigour in the areas already referred to. Clinical investigations in cancer research cover also a wide range of problems, several of them awaiting a practical solution. To learn more about the disease in man and to narrow the gap between the fundamental sciences and the ailing patient, more work in the methodology of clinical investigation is required.

For purposes of both primary and secondary prevention, a number of other areas of study holding promise of useful information have been advocated and are listed below:

- (1) More systematic and extensive efforts should be made to investigate the epidemiology of human cancer and to enlarge thereby our knowledge of its etiology.
- (2) In view of the increasing industrialization which is taking place, and in view of the increase in contamination of air, soil, and water from the effluents from such processes, it is important that the search for additional carcinogens, which may be exerting an influence on the incidence of cancer, be continued and that measures be introduced to control the exposure of the population to such agents. It is important, also, that such substances as pesticides, food additives weed killers, new drugs be investigated for possible activity.
- (3) There is also a great need for administrative research and for more precise information on methods of providing the necessary services to cancer patients.
- (4) More research is also necessary in the social and psychological aspects of cancer as a long-term illness.
- (5) Smoking and its relationship with cancer of the lung is discussed in Section 16.1.3.10

16.1.3.5 Mental Illness

Thanks to scientific advances in drugs and improved rehabilitation techniques, the problem of long-term and in many cases lifelong hospital care for the mentally ill has been substantially reduced. This has not eliminated the problem but only shifted it. Today, community care of the mentally ill and the mental health of the community is becoming a matter of great concern. Vast numbers of former mental patients have been discharged into communities as yet incapable of fully caring for their needs. Although half-way houses, special care homes and sheltered workshops are being rapidly established in all provinces in order to deal with this burden, there is as yet insufficient knowledge, personnel, facilities and total community resources to re-establish these persons as members of the community either in restoration of their abilities for self-care as a minimal goal or to their development into useful productive contributing members to the communities in which they live.

16.1.3.5.1 Departmental Measures(1) Research

When the National Health Grants program was instituted nearly half of all hospital beds in Canada were occupied by patients suffering from mental illness. In view of the magnitude of the problem of Mental Health Grant for the expansion, improvement and development of provincial mental health services was one of the largest of the original ten grants with four million dollars in the first year, with provision for its progressive increase to seven million dollars by 1951-55. In the reorganization of 1960-61, the grant was again increased and has remained in excess of eight million dollars per year. In its early years the grant was applied mainly to the provision of salaries for increased manpower, and for the purchase of technical and scientific equipment required for improved levels of care in mental hospitals. More recently support has been concentrated on the development of community mental health clinics and psychiatric units in general hospitals. An estimated average of 12 percent of the grant has been used annually for training both for scholarships and fellowships

as well as the support of new or expanded training programs in psychiatry, clinical psychology, psychiatric social work and occupational therapy. Throughout the years utilization of this grant has been at the consistently high level of ninety-five percent.

(2) Care of the Mentally Ill

The Hospital Insurance and Diagnostic Services Act excluded mental hospitals from federal sharing of costs. Sharing with the provinces for the care of the mentally ill occurred through the development and recognition of active treatment psychiatric units in general hospitals and the listing of psychiatric hospitals which qualify under the Act, while nursing and domiciliary care homes and sheltered workshops have qualified for sharing purposes under the Unemployment Assistance Agreement and more recently under the provisions of the Canada Assistance Plan Agreement with the provinces. Despite limited reliable information concerning the extent of mental disorders in Canada, there is sufficient evidence that the problem is staggering in terms of persons affected and cost. The operating costs of mental institutions alone excluding psychiatric units in general hospitals in 1965 exceeded \$200 million dollars and the total personnel employed in these institutions numbered over 40,000 persons. When we discuss mentally ill in institutions, we refer only to the top of the iceberg, the visible part of the problem of mental illness. It has been estimated that the prevalence of emotional and mental disorders among school children is between 5% to 10%. Additional estimates say that 3% of the population is affected by mental retardation and psychiatric disorders account for about 6% of the sickness absenteeism in industry. Physicians in general practice consider that emotional problems usually accompany the complaints of many patients. It is also now generally recognized that mental illness while not transmissible in the same way that diseases of bacterial or viral origin is socially communicable and the susceptibility of persons in close contact with the mentally ill is a challenge for timely intervention.

16.1.3.5.2 Future Responsibilities in Mental Health

In addition to the growing reservoir in all communities of persons who have had mental break-downs or been institutionalized, there are very serious social problems facing our society - drug abuse is one example, about which we have very little knowledge or understanding. In order to determine the factors, or to determine what measures should be taken by Canadian society to deal with these, a much expanded program of study into the various psychological and social factors shaping our lives is required. The mental health field bridging the Health and Welfare Fields offers a promising approach to much needed studies of society.

Applied research projects likely to have practical value in the treatment and prevention of mental illness, including pertinent behavioural and other studies on the following is indicated:

1. Mental retardation.
2. Alcohol.
3. Drug addiction.
4. Psychoaases.
5. Child behaviour.
6. Psychological aspects of the maturation and aging process.
7. Organizational studies for improved community services.
8. Public education, including studies of attitudes toward the mentally ill, alcohol, mental retardation, etc., and how to influence these attitudes.
9. Mental health in special settings such as in schools, industries, or particular conditions.
10. Language, communication, learning, motivation, personality development, attitudes, values and interests.

16.1.3.6 Child and maternal health

In the important area of Child and Maternal Health, priority must be given to efforts to reduce perinatal mortality, i.e., the rate at which stillbirths and deaths in the first week of life occur. Related to this is the problem of congenital anomalies and the Department, through its Expert Committee on the Occurrence of Congenital Anomalies, has been directing attention to this area and developing a pilot surveillance system.

16.1.3.6.1 Applied research is indicated. Priority will be given to studies which may lead to preventive measures and to studies of control measures likely to reduce maternal, infant and child mortality and morbidity such as:

1. Studies of complications of pregnancy, notably toxemia of pregnancy.
2. Studies of prematurity.
3. Studies of other problems of neonatal adaptation.
4. Studies of growth and development.
5. Studies of maternal and child nutrition.
6. Studies of congenital anomalies including human teratology.
7. Studies of the organizational aspects of maternal and child health services and programs involving clinical services, hospital services and community health programs.

16.1.3.7 Nutrition

Undoubtedly the major nutritional problem in Canada now is obesity, which is essentially due to an intake of calories in excess of metabolic requirements. However, the question has also been raised whether Canadian children are under-nourished. The Food and Drug Directorate with the collaboration of the Nutrition Division and a Consultant recruited from the School of Hygiene, University of Toronto has already initiated a pilot feasibility study of ways and means to properly investigate this question.

16.1.3.8 Dental

Dental caries are known to affect more people in Canada than any other disease. For a realistic assessment of the total dental health status and needs of the Canadian population the development of a National Dental Health Index, on a continuing basis, is a scientific problem of first priority. Also of major concern is the development of dental resources. There is a grossly evident manpower shortage within the dental profession in Canada. There is a need for more teaching facilities to attract more dental students. Research should be continued relative to possible ways and means of increasing the useful duties performed by dental auxiliaries.

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Promotion of an increase in utilization by the community, the family and the individual of measures scientifically known to be safe, practical and effective in the promotion and control of dental disease is still one of the main problems of public health education at all levels of Government and should also be given high priority.

16.1.3.8.1

Research is indicated in the following areas:

1. Studies on the supply and distribution of personnel of various kinds for rendering dental services.
2. Operational research as applied to the rendering of dental services.
3. Studies to evaluate programs in public health dentistry.
4. Studies to evaluate hospital dental services including their public health significance.
5. Studies to evaluate dental service procedures for particular groups (e.g., the handicapped and the chronically ill).
6. Mass screening procedures related to oral cancer.
7. Epidemiological studies relating to oral disease and disability.
8. Periodontal disease, its prevention, epidemiology, relation to aging and to personal health.
9. Malocclusion, its epidemiology, prevention and control (including growth and development studies and congenital anomalies).
10. Dental geriatrics.
11. Dietary and nutritional aspects of dental diseases.
12. Studies to evaluate oral disease control procedures, including health education materials.
13. Dental roentgenography - methods, dangers, protective devices.

16.1.3.9

Nursing

Nurses comprise the largest operational group in the health professions. The training and utilization of nurses has been undergoing crucial changes, some in response to systematic studies while others in response to the needs and demands of the situation. Further applied research is required relating to

nursing care, nursing services and nursing administration. Such studies might include:

- (1) The supply and utilization of nursing personnel for various types of service.
- (2) Functions of nurses in relation to their training.
- (3) Development of methods for identifying patient needs and for evaluating the nursing care received.
- (4) Experimental studies and evaluation of nursing methods in all fields.
- (5) The safety and economy of various types of nursing units, equipment and procedures in relation to what they are trying to accomplish.
- (6) Multidisciplinary patient care problems.
- (7) Effect of systems changes on the requirements and utilization of nursing personnel for improved patient care.

16.1.3.10 Smoking and Health

Lung cancer is one cause of high and increasing mortality for which we have a means of prevention. Prevention is feasible for only a few types of cancer. Therefore the Department has been engaged in an active program of health education directed to informing the public of the hazards of cigarette smoking and to influencing people to avoid or break the habit. As already reported earlier in this Brief, a nationwide program was undertaken by the Department in co-operation with the provinces and other interested agencies to deal with the problem of cigarette smoking in Canada. The basic objective of this program is: "To reduce the incidence of lung cancer and other diseases attributable to cigarette smoking, by the reduction or elimination of this health hazard".

16.1.3.10.1 To reach these objectives more studies are indicated as follows:

1. Studies of the prevalence of smoking among various Canadian population groups.
2. Studies concerning various aspects of the control or moderation of the smoking habit.

3. Studies of attitudes towards smoking and social patterns of smoking.

16.1.3.11

Microbiology

The dramatic reduction in the occurrence, sequelae and mortality from communicable disease cannot be attributed mainly to secular change. The scientific efforts and objectives towards the control of communicable diseases if our laboratories in co-operation with provincial laboratories and international organizations is described elsewhere in this Brief. The output of literature in Volume II further attests to their accomplishments. A larger amount of unfinished work remains to be done in the control of communicable diseases and environmental sanitation in Canada. A basic level of services for the continued sanitary control of water, milk and food supplies and sewage disposal is necessary. Continuing immunization programs are needed to maintain adequate levels of immunity against diphtheria, pertussis, tetanus, poliomyelitis and smallpox.

16.1.3.11.1

Salmonella infections

One problem area requiring the co-ordinated effort of several agencies, including this Department, Agriculture, and possibly Fisheries, relates to the need for measures to avoid salmonella contamination of foodstuffs associated particularly with the increase in modern mass-feeding practices, especially in poultry.

16.1.3.11.2

Applied research which should lead to better control of communicable diseases is still needed. Such studies might include epidemiological, preventive, diagnostic, and therapeutic procedures. Priority is suggested in the following order:

1. Developmental research

- (a) To improve techniques and services e.g. more rapid isolation and identification of agents ("fluorescent

- antibody techniques", "immuno-electrophoresis", "specific bacteriophages" and new ideas).
- (b) On diseases of viral origin, e.g. hepatitis (isolation, cultivation and laboratory diagnosis of etiological agent(s)), picorna viruses (classification, relationship to human illness) myxoviruses.
 - (c) Related to drug therapy, e.g. antiviral drugs, site of action, tissue affinities, development of resistance, effects on intestinal flora, drugs combinations, effect of residuals in foods treated with antibiotics as preservatives.
 - (d) Related to vaccines, e.g. new vaccines for diseases of public health importance (infectious hepatitis, rubella, the common cold, improved measles vaccines - gonococcal vaccines may be the best hope for control of the disease - staphylococcus and meningococcus vaccines - vaccines for enteropathogenic Escherichia coli), the isolation of the immunizing fractions of established vaccines, such as pertussis vaccine, so as to eliminate the histamine - sensitizing factor and toxic properties and retain the protective antigen, the effects of adjuvants such as alum, routes of administration (aerosols), field trials of these new or improved vaccines, improved assay techniques.
2. Zoonoses, especially methods of study and epidemiology, e.g. surveys of the distribution of these zoonotic agents in the domestic and wild animal life, their relationship to human disease, vector studies.
 3. Control aspects of institutionally acquired infections, e.g. general institutional sanitation, ventilation, disinfection, carriers.
 4. Evaluation of infectious diseases in a community setting - the spread of a disease in a community may be quite different from that of a hospital or closed institution. What is the effect of the hospital on disease in the community.

5. Organization of community resources for the prevention and control of infectious disease, e.g. the importance of the bacteriologist, the physician, the medical officer of health, the veterinarian, the food processor and food handler are all essential to the control of salmonella food poisoning.
6. Public health aspects of mycobacterial diseases, especially those concerned with prevention and control - the role of the unclassified (atypical or anonymous) mycobacteria, - the specificity of skin test antigens.
7. Development, standardization, and improvement of biological or chemical reagents used in the diagnosis of these diseases.

16.1.3.12

Health Education

It would appear that the major problems facing health education in the next few years will be related to manpower shortage of health education specialists. With the advent of Medical Care programs, the need for specialists to interpret the available services within the broad spectrum of health care will be even more urgent than in the past.

Health education advisory services within the Department are conscious of the need to achieve better co-ordination of departmentally-initiated educational activities with those of the provinces. This represents, perhaps the most pressing need at the present time. Another pressing need is the identification of special population groups requiring specific and intensive health education services.

The funding of operational research in the field of behavioural science will need to be formalized in order to provide a basis for an effective practice of health education nationally, provincially and locally.

16.1.3.13

Control of Tuberculosis

Tuberculosis deaths have declined dramatically since the introduction and widespread use of antituberculosis drugs in the early 1950's. Deaths which were in excess of 3,500 per annum around this time were reduced to approximately 700 in 1966. Reported new active cases of tuberculosis which were slightly in excess of 11,000 cases in 1950 have shown a much smaller

decline to 4,800 cases in 1965, and have increased slightly in each succeeding year. (1967 - 9,437 cases).

The introduction of antituberculosis drugs created a tremendous impact on the treatment of the disease. Patients who were formerly hospitalized for periods which usually averaged about two years, now remain in hospital for approximately four to six months. Thereafter they are allowed to return home, having been rendered non-infectious. To be effective, however, the drugs have to be continued for a period of 18 months to 2 years so that the emphasis has shifted from the hospital to home supervision of the patient.

Despite this dramatic change, it comes as a surprise to most observers to learn that hospitalization of the T.B. patient still constitutes a major factor in terms of cost and days of hospitalization. In 1961, for example, when 5,966 new active cases of tuberculosis were reported, there were over 3,000,000 days of care for tuberculosis, so that it ranked second after schizophrenia as the medical condition responsible for the greatest burden on hospital beds. Looking at it another way, tuberculosis may be said to be as important as all other infectious diseases combined, since the number of days of hospital care are approximately the same for each group. Because of the shift in emphasis in the care and follow-up of tuberculosis cases from the hospital to the community, it is also important to have some measure of the number of cases of tuberculosis which have been registered in the provinces. A study of this aspect of T.B. was carried out in 1961 and showed that there were almost 200,000 inactive cases of tuberculosis registered as of that year. Since these individuals have an unusually high risk of breakdown of the disease, it may be seen that this creates a great burden on diagnostic and follow-up facilities in chest clinics. Present recommendations are that such cases should be followed up on an annual basis.

The total cost of tuberculosis health services is considered to run at about \$100,000,000.00 per annum.

16.1.4

Facilities and resources

In discharging its responsibility for promoting the health and welfare of Canadians and improving the health and welfare services available to our people, the Department must obviously be concerned with the facilities and the personnel needed to provide such services. This entails concern over the construction of hospitals, and welfare institutions, of medical schools,

nursing schools and schools of social work. It implies concern over the development of adequate health and welfare manpower, the training and allocation of suitable professional personnel. No doubt the Department of Manpower also has an interest in this same area. Facilities would include not only professional schools and hospitals, but also clinics, day care centres, neighbourhood centres, homes for special care, psychiatric treatment centres, institutions for the mentally retarded, research centres, and so on. The Health Resources Fund was established to promote federal participation with the provinces in ensuring an adequate supply of professional health personnel, in anticipation of increased needs with the advent of medical care insurance. The Welfare Grants program was intended, among other things, to encourage an increase in the supply of professional welfare personnel. An evaluation of both these programs may be needed to see how effectively they have been achieving their original objectives. Many potential problem sources could be expected in the hospital insurance program, but in general, procedures have been well developed for avoiding or overcoming these by such devices as advisory committees and working parties involving representatives of the provinces and relevant professional and specialist fields. Similar co-operative arrangements have been or are being worked out for the Health Resources Fund and the Medical Care program, and Welfare Grants Program. Particular problem areas of concern include questions of the best methods of delivery of health and welfare services, the appropriate use and preparation of allied health personnel, the preparation and utilization of welfare personnel, the use of modern equipment for treatment and administration, staff shortages, and rising costs of providing services.

16.1.5

Hospital and Other Health Facilities

Practical studies relating to more effective development and utilization of hospital and health facilities, services, and resources are indicated as follows:

A. Studies Relating to Beneficiaries

1. Social and demographic characteristics of the covered population.
2. Hospital and medical care needs of the population -
 - (a) study and development of suitable survey methods for evaluating the need in specific communities (and/or selected groups or geographical areas) for new or additional medical facilities and services, in terms of buildings and equipment;
 - (b) pilot surveys which develop or illustrate methods.
3. Response to hospital services offered.
4. Hospital and medical care needs in relation to dependency.
5. Architectural and functional design of facilities -
 - (a) to develop desirable room relationships and traffic flow patterns in the hospital, which will promote efficient working conditions and minimize the hazards of cross infection;
 - (b) efficiency studies of various air conditioning equipment components for hospital use, related to the reduction to within safe limits of airborne pathogens;
 - (c) hospital equipment, for example operating room tables, with reference to desirable combinations of function such as built-in air scavenging and electronic equipment wire conduit;
 - (d) multi-discipline assessment studies of hospital materials handling devices such as conveyors, elevators, chutes (soiled linen and trash), pneumatic communication tubes, etc. to identify potential hazards such as cross infection;
 - (e) particulate contamination studies, to relate knowledge gained in industrial radio-active products labs, aerospace and submarine technology, industrial "white room" assembly areas, to possible improvements in Hospital design.
 - (f) study and development of suitable survey systems for measuring the adequacy of existing hospital buildings, to determine the degree of obsolescence of plant

and equipment and to aid in determining requirements for renovation and improvement.

B. Studies Relating to Administration

1. Utilization and costs.
2. Research into trends.
3. Comparisons of the effects of different types of administration.
4. Studies of mechanisms designed to control cost and/or enhance quality of care -
 - (a) study and development of suitable cost analysis systems, for estimating and allocating funds;
 - (b) study and recording information on current costs for construction and renovation of hospitals; identification and assessment of factors which introduce variations from norms;
 - (c) study of operational costs related to building design, building standards, fuel and energy requirements;
 - (d) studies of automated systems applied to hospitals with reference to feasibility, economics, efficient use of hospital personnel, etc.;
 - (e) identification of new hospital building requirements from existing use and rate of growth statistics, by means of computer programs, etc.;
 - (f) correlation studies of various building design components (ventilation systems, material distribution systems, sanitation systems) and the incidence of cross infection in hospitals.

C. Studies Relating to the Community

1. Research to examine the influence of the availability and distribution of hospital and medical care resources on the quality of the program.
2. Studies of the impact the program has on the health status of the community.
3. Examination of the comparative effects of special programs contrasted with generalized programs covering the same disease entity or the same population category.
4. Area planning for hospital facilities and other medical facilities.

16.1.6

Distribution and Delivery of Health and Welfare Services

Recent awareness of the problems arising out of fragmented, uncoordinated services has given rise to concern about the maldistribution of the fruits of modern knowledge and technology. This has led to the development of models for planning and implementing Area-wide Services providing a full range of health and social utilities¹ to a given population. Considerable work remains to be done in identifying and overcoming impediments to the organization and provision of comprehensive care.

16.1.6.1

COMMUNITY HEALTH SERVICES

Research projects oriented towards community health services, is indicated. These projects may be concerned with methods of planning, organization, providing and evaluating health service in general, services for specific diseases, or services for particular categories of people or patients.

Priority consideration should be given to the following types or fields of research, but not necessarily in the order listed:

1. Research to determine and to rank health needs.
2. Research in methods for planning and evaluating health programs, including development of standards and methods of quality control for community health services.
3. Research concerned with the responsibilities, roles and relationships of resources available for public and personal health services including official and voluntary agencies, hospitals and other institutions and facilities, persons in the health professions, professional organizations, and other interested persons, groups or organization.
4. Studies on recruitment, training and utilization of personnel needed for health services.

¹ A term coined by Alfred Kahn of Columbia University to replace the older term of social services and place them on a more universal footing with public health services.

5. Studies on medical manpower and the nature of medical practice; similar studies for other health personnel.
6. Studies of the general health status in and of communities and the significance and interaction of cultural, political, behavioural, economic and sociologic factors.
7. Projects and pilot studies concerning the development of research programs in community health services including methods for conducting such research.
8. Studies of the responsibility and role of the Medical Officer of Health and of the Health Unit or Department in the planning, implementation and evaluation, including co-ordination, integration, and use, of health services in the community.

16.1.7

Epidemiology and Biometrics

The Public Health Research Grant Administration welcomes applications designed to study the distribution and determinants of disease, disability and death in man, and methods of controlling these conditions, as well as the determination of health needs and resources and the appraisal of the workings of health services.

Epidemiology is the basic science of public health and epidemiological study areas of special interest are indicated in other sections of this brief. Priority is given to studies respecting major public health problems. All three types of epidemiological approach are considered, namely descriptive analytic and experimental.

The use of statistical methods is an integral part of epidemiological studies; from the earliest planning stage it will be expected that proper statistical design and suitable plans for data collection, processing, analysis, and interpretation have been provided. Biometrics may be useful in any health field or health study, and is essential in some.

Consideration will also be given to the development of mathematical or statistical models related to specified conditions in which measurements and evaluation techniques are sufficiently reliable for the purpose.

16.1.7.1

Tuberculosis

Tuberculosis deaths have declined dramatically since the introduction and widespread use of antituberculosis drugs in the early 1950's. Deaths which were in excess of 3,500 per annum around this time were reduced to approximately 700 in 1966. Reported new active cases of tuberculosis which were slightly in excess of 11,000 cases in 1950 have shown a much smaller decline to 4,800 cases in 1965, and have increased slightly in each succeeding year. (1967- 5,437 cases).

The introduction of antituberculosis drugs created a tremendous impact on the treatment of the disease. Patients who were formerly hospitalized for periods which usually averaged about two years, now remain in hospital for approximately four to six months. Thereafter they are allowed to return home, having been rendered non-infectious. To be effective, however, the drugs have to be continued for a period of 18 months to 2 years so that the emphasis has shifted from the hospital to home supervision of the patient.

Despite this dramatic change, it comes as a surprise to most observers to learn that hospitalization of the T.B. patient still constitutes a major factor in terms of cost and days of hospitalization. In 1961, for example, when 5,966 new active cases of tuberculosis were reported, there were over 3,000,000 days of care for tuberculosis, so that it ranked second after schizophrenia as the medical condition responsible for the greatest burden on hospital beds. Looking at it another way, tuberculosis may be said to be as important as all other infectious diseases combined, since the number of days of hospital care are approximately the same for each group.

Because of the shift in emphasis in the care and follow-up of tuberculosis cases from the hospital to the community

it is also important to have some measure of the number of cases of tuberculosis which have been registered in the provinces. A study of this aspect of T.B. was carried out in 1961 and showed that there were almost 200,000 inactive cases of tuberculosis registered as of that year. Since these individuals have an unusually high risk of breakdown of the disease, it may be seen that this creates a great burden on diagnostic and follow-up facilities in chest clinics.

Present recommendations are that such cases should be followed up on an annual basis.

The total cost of tuberculosis health services is considered to run about \$100,000,000.00 per annum.

16.1.8 Fitness and Amateur Sport

In response to the growing concern among Canadians, about performances of Canadian athletes in international competition, a three-member Task Force has been commissioned by the Minister to suggest improvement in the following areas:

- (a) the difference between professional and amateur sport in Canada, both in definition and in concept, as well as the effect of professional sport on amateur sport.
- (b) relations between the federal government and private national and international organizations, such as the various sports governing bodies, and the means by which they work together to promote and develop Canadian participation and excellence in amateur sport.
- (c) the methods by which the government itself can assist in improving the extent and quality of Canadian athletic competition both at home and abroad.

16.1.9 Poverty, A Major Welfare Issue

Many of the factors associated with welfare are really problems of social breakdown, and in fact responsibility for the solution of some of these problems has moved out of, or is not mainly within, the welfare field. Among these we may name delinquency, alcoholism, suicide, illegitimacy, mental illness, school dropouts, unemployment, death, desertion or absence of breadwinner of a family. Areas where poor people live generally show a concentrated amalgam of these problems along with the poor or deteriorated housing stock that we generally refer to as slums.

Adequacy of clothing in relation to climate and occupation a matter of concern in Canada. Accessibility of care still another factor, and the final factor which might be added perhaps is that of recreation. Recent studies on the culture of poverty have thrown emphasis on the facts that lack of money, ill health, poor housing, inadequate clothing, delinquency, alcoholism, discouragement, etc. all go together as part of the general culture of poverty. This of course, was well known, observed, and written about at the turn of the century. In between these two

points in time however, concentrations on the various specialties, and divided jurisdictions within this tangled web, trapping the poor for generations, led us away from thinking about poverty as an evil in itself which required concentrated attention on the part of governments. Thus provisions for special categories of persons thought to require assistance to enable them to manage was the rule. And over the years in Canada, a system of assistance had been provided for needy mothers, for the aged, for people with severe and apparently irreversible disability and for the blind. In addition assistance was provided for the unemployed through unemployment assistance and for the return to the labour force of those who could be rehabilitated through vocational rehabilitation.

16.1.9.1

The Canada Assistance Plan which came into force on July 15, 1966 was the first comprehensive program for social assistance to bring assistance to persons regardless of the reason for need, and federally at least, substituting the concept of a needs test with no ceiling established on the amount of assistance available for the usual means tests for entitlement to assistance.

At this stage we can assess the costs of the C.A.P. and defend its intentions. Benefits and impact, however are extremely difficult to relate in a cause-effect relationship to specific inputs. Moreover the real benefits may be cumulative over a period of time and impossible to assess with the tools and data available to us now.

Various Canadian studies have provided us with profiles of poverty in Canada. We can identify the population at risk today as those aged 65 and over, especially the very aged and aged women, the single parent family headed by women those living in regions which have not kept economic growth pace with the rest of the country, persons of low education and poor marketable skills, Indians, Eskimos and Metis, and hourly-rate workers whose wages are insufficient to maintain families and households at present costs. Such studies need to be sifted, updated, refined and expanded to provide solid information for social policy. Moreover, we need more community self studies with the participation of the persons now affected.

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The Guaranteed Income Supplement has undoubtedly brought a measure of relief to some of the first category and the lowering of the Old Age Security qualifications is expected to do likewise. The Canada Pension Plan should substantially reduce the number of needy aged for the future. The C.A.P is theoretically available to all Canadians in need, but practically, provinces have income ceilings to defined needy persons and help is generally only extended to those who apply therefore we need further studies to determine the proportions reached by the direct benefit available under this program. Indirect benefits through community development, strengthening and extension of day care facilities, homemaker services, institutional care, etc. may be expected to reach a wide number of persons requiring services rather than money.

The department which has worked closely with the Special Planning Secretariat and A.R.D.A. looks forward to close co-operation with the proposed Committee of the Senate on Poverty and with the new Department of Regional Development as well as the other interested agencies in working out policies and strategies for the effective control of poverty.

MAIN CAUSES OF DISABILITY IN CANADA (ESTIMATED) 1965

Cause of Disability	Estimated number of People Afflicted 1965
1. Mental and emotional disorders	2,032,000 (1)
2. Diseases of the heart and circulation, including cerebrovascular diseases (mainly due to arteriosclerosis)	775,000 (2) (3)
3. Arthritis and rheumatic diseases	333,000 (2)
4. Neurological disorders, including:	
Epilepsy	105,700 (2) (5)
Cerebral palsy	32,300 (2) (5)
Multiple sclerosis & other demyelating diseases	29,400 (2) (5)
Parkinsonism	29,400 (2) (5)
Muscular dystrophy	11,700 (2) (5)
5. Deafness	176,000 (2)
6. Mentally retarded	587,000 (1) (4)
7. Blindness and near blindness	137,000 (2)
Registered with CNIB March 31, 1966 25,776 (6)	
Prevention cases, registered with CNIB March 31, 1966 124,974 (6)	
(The figures for 1965 are 25,339 and 117,995 respectively)	
8. Diabetes mellitus	150,700 (1)

- Sources:
- (1) Calculated using the 1965 population of Canada and the rates given in the Royal Commission Report on the Health of the Canadian People by Robert Kohn, 1965.
 - (2) Illness and Health Care in Canada, Canadian Sickness Survey 1950-51.
 - (3) Hospital Morbidity Statistics, January 1 - December 31, 1964.
 - (4) Mental Retardation in Canada, Report of the Federal-Provincial Conference, Ottawa, Canada, October 19-22, 1964.
 - (5) Prorated according to the Estimated Number of People Afflicted as given in "What are the Main Causes of Disability in the United States?".
 - (6) National Reports of The Canadian National Institute for the Blind for the years ended March 31, 1966 and 1965.

17. FUTURE PLANS

17.1 Problems Related to Scientific and Technical Information
Establishment of a National Health and Welfare Communications
Centre.17.1.1 Introduction

This Section deals with problems related to the transfer of scientific and technical information experienced by the Department during recent years and describes the organization and functions of a National Health Sciences and Social Welfare Network which is currently being established.

17.1.2 Definitions

"Scientific and technical information is the life-blood of progress in a technically advanced society. As much a national resource as the stock of laboratories and trained personnel, it is also the basis for decision by research scientists, development engineers, project managers and others, whether in the Universities, industry or the public service. It is a powerful factor in the exploitation of discovery and the transfer of technology."¹

Included here in "scientific and technical information" are all facts, concepts and instructions arising in the natural and social sciences and their related technologies, and capable of being communicated, interpreted and processed. An "information system" is an organization of men, machines and bibliographical materials towards the efficient storage and transfer of knowledge.

17.1.3 General

The communication problems arising out of the rapid growth of science and technology considered as a whole, are exceedingly complex and of great significance to both management and scientists. The growth of science is something very much more active, more vast in its problems, than any other sort of growth taking place in the world today. More important, science is growing more rapidly than anything else.

The core of the problem is not so much the acquisition of additional knowledge as the more adequate distribution and use of information already revealed to scientists, chiefly in published sources.

It has been estimated that approximately 35,000 scientific journals are in current publication, and that 10,000 titles are important in health and social welfare.

The number of health science papers published annually would exceed half a million.

The drug literature itself is increasing rapidly in size, and its scientific character is undergoing significant changes. In part, these are derived from the many advances in documentation techniques, but more profoundly from the rapid growth and change in the pharmaceutical field caused by the constantly increasing attention to health problems and the multiplication of amounts spent for research thereon. It has been calculated that seven out of ten prescriptions written today are for items unknown to medicine before World War II.

The communication problems that result are more serious here than in any other area since human health and life itself are involved.

As a result, users are expressing difficulties with:

- (1) keeping up-to-date with pertinent literature in the field;
- (2) finding what information exists on the topic of immediate concern, and
- (3) locating sources of information required.

In short, we are witnessing a steady growth of the total body of knowledge which is becoming more complex, unwieldy and difficult to manage, and the Department is not exempt from a problem which is real, international in scope and science-wide.

17.1.3.1

Problem related to the planning and organization of scientific and technical information

The leading problem is in planning and organizing scientific and technical information, the unknown working of the human mind in its use of information, leading to perplexities in measuring the optimum of how much, to whom, in what way, how quickly, the whole being conditioned by technical, legal, and financial considerations.

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The Volume

How much will require the development of plans for the distribution of guides for retrieval of information from sources such as printed pages, sound recordings, films, microrecords and computer tapes. Legal considerations of the reproduction of copyrighted material, assessment of the validity and significance of the material and other qualitative factors must be taken into consideration.

The Users

The nature of health sciences and social welfare information require considerations of control to avoid undesirable, if not criminal, use of information that could harm or that would constitute an undesirable invasion of privacy. In this area a concept of "qualified user" is particularly pressing. The wide distribution of practitioners is another factor.

Communication Technique

Cost decisions, based on criteria, are necessary for the use of newer and more complex technology in supplying information. Many needs can be met in simple ways instead of using expensive and sophisticated equipment. Cost considerations suggest a selective use of special means of communication.

Recorded Information from Other Countries

A special problem in Canada is the need for importing recorded information from other countries either directly or through producers' agents. There is evidence that in the area of printed materials the Canadian book trade is moving to provide improved services at the college level and may well be further encouraged to develop further services for the assistance of research and professional personnel at a post-graduate and continuing education level.

Departmental Aspects

17.1.3.2

A. Intramural

a) The Departmental library

The activities of the libraries are increasing rapidly and becoming far more complex.

There are substantial increases in serial titles, primary and secondary, books and reports. Consequently more space for library stock and accommodation for staff to handle an increased load of selection, acquisition, processing, dissemination of information and provision of information for specific requests is needed.

The arrival of additional computer facilities in the Department will call for assigning staff to assist with the design of systems for

- many clerical tasks in connection with ordering, cataloguing, circulation and the production of lists of new material--in time, special subject lists;
- the use of published bibliographies in computerized forms together with criteria for the circumstances when such forms are more useful than bibliographies in print;
- preparation of computerized bibliographies of material, not included in prepared forms, compatible with standards of prepared forms.

It is apparent that more staff-time must be devoted to the orientation of scientists in the use of new forms of secondary publications to enable them to make a more effective use of library resources.

17.1.3.3

B. Extramural

a) General Requirements

The most general requirement is to provide any user on a nationwide basis with the information he needs when and where he needs it and in the form best suited for his purpose. This, it is believed, could be achieved through a re-evaluation of existing programs and the development of scientific plans to transform the present varied services into a system that could function on a more coordinated basis. An initial survey of the majority of the provinces

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was already made to determine their requirements in terms of scientific and technical information services. Preliminary findings have indicated that there exist serious gaps in terms of services available.

b) Specific needs

I - Research

Systematic research and development in scientific communication is relatively new. A balanced, long-term program of research, including behavioural studies and new conceptual approaches to communications, as well as exploitation of mechanical and electronic devices is required for major improvement in health communications. In the field of health, more centres for research and development are needed in the health community to provide an appropriate environment for developing the entire spectrum of document and information-processing services to exploit the potential of audio-visual media, to improve methods of oral communication and to conduct further research on the fundamental processes of health communications.

II - Scientific and Technical information requirements for scientists and R & D management

There is also a need for more systematic scientific and technical information relating to R & D conducted by other federal government departments and agencies sponsored by these agencies.

Two categories of information are needed for the following groups of people -

- (a) at the performing level recorded data, descriptions and results obtained from research and development activities are needed by scientists. This is considered necessary as advancement in science and technology occur in general only through building upon

past accomplishments or extending existing frontiers into new and unexplored territory; ¹

- (b) at the management level, both this category of information as well as resources information are also very important. Resources information should be available in sufficient depth or detail to allow analysis of specific areas of support and manpower availability in assessing existing investments for comparison with project needs and future goals. Sound planning and decision-making require that both types of information be available in the appropriate admixture at the various levels of management.

b) Training

There is a need for more qualified personnel for the expansion and improvement of information services for the health community and research and development in health communications. There is urgent need for the training of health sciences librarians, information specialists and other personnel of varying background to serve as indexers, programmers, searchers and abstractors.

There is also a requirement for the continuing education of personnel concerned with document-handling in the health sciences.

17.1.3.4 International needs

Health and welfare communications are also increasing rapidly at the international level.

There is need for cooperative efforts at the international level that will promote large-scale experimentation, the introduction of innovative techniques and the necessary basic standards for assuring the compatibility of the various information systems. Progress in scientific communications at the international level can only be accelerated if functional national and regional scientific organizations will put their house in order and take the initiative for international action.

¹ Scientific and Technical Communication in the Government -
U.S. Department of Commerce, AD 299545

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17.1.4

Federal Initiative

The Federal government alone interacts with all of the elements of the information systems; it is uniquely able to examine the overall problems from a properly general viewpoint and to guide and otherwise support measures for unifying our communications and so preserving that unity of science and technology that is indispensable to their effective pursuit.

17.1.5

Action taken by the Department

For some years the Department has experienced problems of communication particularly in the health field. This situation lead to the establishment, in the year 1964 of a departmental Health Communications Committee to make continuing studies, on a priority basis for communication problems and to prepare and recommend specific action to meet them.

17.1.6

This Committee devoted many sessions to explore and define varied and complex problems of health communication of departmental significance.

1. Surveys, Operations, Research and Visits to Libraries

A study on the purposes and functions of health sciences libraries with special reference to the intramural and extra-mural aspects of the Department of National Health and Welfare library was made.

2. Analysis of requests originating outside the Department, together with the study of other services and observations on the trends of demands for services unrelated to formal commitment were made.

3. Continuing studies of health communications systems and health library arrangements used in the United States, United Kingdom and Continental Europe were made and supplemented by visits of members of that Committee.

The visits formed part of a broad liaison program throughout the world to have access, collect information and also keep abreast of the application of developments in the field of communications in selected countries.

17.1.7

Establishment of a National Health Sciences and Social Welfare Network

The Department has developed a plan for an information network for the nation designed for the specific needs of practitioners and research workers in the health sciences and social welfare. This plan is conceived as being anchored by units on National, Regional and Local levels for Health and Welfare Communications of Information, with the Department assuming responsibility for the National Centre and the Provincial Government Depts. of Health or Welfare assuming responsibility for Regional and associated Local Centres. Discussions so far have been carried on with Provincial Health Departments, however, provision has been made for adjustments that may be desirable for the views of officers of Provincial Welfare Departments. The objectives and functions of the National Centre have been worked out in greater detail than those of Regional and Local Centres that will be shaped by the views of provincial government officials in accordance with the special circumstances of their areas of jurisdiction.

This system of health communication should eventually form part of a broader network of nationwide information systems designed to bring about better coordination and improved federal and non-federal information activities embracing all sciences.

17.1.8

National Health and Welfare Communications Centre.

17.1.8.1

(D.N.H.&S.W.)

(a) Objectives

1. The Centre will provide a focus of leadership and co-ordination in assessing and developing new activities to improve the communication of health sciences and social welfare information in Canada, and will provide the means of liaison with corresponding activities in other countries and with networks in other subject fields both in Canada and abroad.

The present view is one of communication along the lines of:

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1. scientist to scientist so that their research efforts can complement one another;
2. researcher to practising physician or social scientist so that new knowledge can restore physical or social health as quickly as possible; and
3. health sciences and social welfare professional workers to the public, so that people may act to preserve and improve their own health and social well-being.

17.1.8.2

(b) Policies

1. The Centre would assist in the formulation, coordination and implementation of an overall policy concerning the departmental role with respect to the operation of a national system of health and welfare communications.
2. It would be responsible for collecting, organizing, processing and distributing records of information relevant to human health and social welfare, serving as the primary national resource for these functions.
3. The Centre would be the central repository and the coordinating agent for the multiple specialized information centres designed to meet and to furnish information needs related to human health and social welfare.
4. It would stimulate and provide financial and technical assistance for the development and improvement of libraries, specialized information centres, and other organizations concerned with scientific and technical information in the health field and social welfare field.
5. It would provide technical and financial assistance for the training of personnel concerned with programmes designed to improve scientific and technical information services in the health and social welfare field.
6. It would provide technical and financial assistance for research concerned with scientific and technical information in the health and social welfare field.

17.1.8.3

(c) Functions of the National Centre

These are distributed between three divisions:

1. Library Division

2. Research, Training, Planning and Evaluation Division

3. Scientific and Technical Information Division.

1. Library would be concerned with the selection and maintenance of a reasonably comprehensive research collection on health sciences and social welfare subjects, with information services records and other technical assistance to Regional Centres in addition to continuing with the usual information services to direct users of the Library already in existence.

2. Research, Training, Planning and Evaluation Division.

This Division would conduct research on health and welfare communications and would offer technical and financial assistance to agencies conducting research in this field such as the development cost and effectiveness of new techniques, media, systems and equipment within the framework of a coordinated compatible system. Continuous planning and evaluation to determine the worth of systems and to detect the need for changes and adjustment is considered highly important.

3. Scientific and Technical Information Division. This division is to be concerned with the critical evaluation, synthesis and the like processing of information by qualified personnel competent to judge worth. The Division would also maintain a continuing inventory of specialized information centres and/or services in Canada and in other countries.

17.1.8.4

Advisory Committees, Regional and Local Centres

Advisory Committees Planning officers of the Department are of course mindful of the need of developing national systems of health and welfare communications in close consultation and coordination of agencies such as Provincial Government Departments, universities, voluntary societies, etc. To this end it is

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proposed that an Advisory Committee be established by Order-in-Council under Section 6 of the Department of National Health and Welfare Act to advise, counsel and guide the Department in the discharge of its information responsibilities relating to health and social welfare communications. Broad policy aspects of the programme would be discussed periodically during meetings of the Dominion Council of Health. There may well be a need for further special committees to consider and advise on various technical aspects.

Regional and Local Centres

The planning of such centres should largely be undertaken by Provincial Governments in accordance with special needs and characteristics.

It is broadly conceived that policy planning would be co-ordinated with the National Centre and that Regional and Local Centres would assume responsibility for supplying directly needs for material in high demand and for obtaining material of lower demand from the National Centre. Regional Centres are likely to conduct planning, evaluation studies of services and information for their areas.

Local Centres are conceived as being the type of health sciences and social welfare library maintained in hospitals. Their sources of technical assistance and channels of communication would be an appropriate Regional Centre.

The concept in this planning has been the provision to each health science and social welfare practitioner in Canada of a clear means of service from Local to Regional to National to International in accordance with their information needs and regardless of location.

17.1.8.5

Forecast of events

It is expected that the "Network" will be operative by 1970.

17.2 Manpower Planning17.2.1 Preamble

There is a need in Canada for a comprehensive program to improve the quantity, quality and utilization of health and welfare manpower now and in the years ahead.

The training of health scientists requires extensive professional education and in general they require several years of post-doctoral research experience to become established as fully qualified research investigators. Training in social work has on the whole been service-oriented and the field suffers today from an undersupply of personnel competently trained in research methodology.

In the health field, the Federal Government has recognized this need by establishing the Health Resources Directorate within this Department and giving it the responsibility for developing a health manpower program and also by providing capital assistance for the creation of new health training and research facilities through the Health Resources Fund.

In the welfare field, as stated earlier in the Brief, the National Welfare Grants were inaugurated to relieve the critical shortage of appropriately trained social welfare manpower to improve the quantity and quality of applied research and to support experimentation and innovation in welfare services. Under the National Welfare Grants are included scholarships, fellowships and teaching and field instruction grants to Canadian schools of social workers. It is our interest that the Canadian Association of Social Workers receive financial assistance under the program for an assessment of the professional qualifications of immigrants to Canada with social work education in other countries. In the fiscal year 1966-67 payments for teaching in field instructions and scholarships and fellowships totalled over 40% of all the expenditures under the National Welfare Grants.

17.2.2 Intra-mural aspects

Effects of scientific activities on the operations of the Personnel Administration Directorate.

17.2.2.1

Results of Change in Technology

Whereas it is unlikely that the major responsibilities of that Directorate will change significantly as a result of changes in technology during the next five to ten years, i.e., it is to be expected that the Personnel Administration Directorate will continue to have responsibility for Recruitment and Selection, Manpower Planning, Training, Staff Relations, Classification and Pay Administration and General Personnel Services which are its major responsibilities, it is anticipated that changes in technology will have a major effect upon the means by which these responsibilities are fulfilled.

Competence and efficiency are the consequences of careful selection of personnel, suitable training and education programs, and planned career development programs. We recognize that the most significant force in the world today is change, which in itself is disruptive and to a considerable degree may be described as self-accelerating. At the same time changes may be desirable. There is no reason to assume any decrease in the disruptive force of change as it is occurring today and, if anything, the problem of change as it affects manpower, could become even more difficult to assess. There is a possibility that educational and training institutions as they exist today, will be less able in the future than at present to satisfy the manpower demands of the Department of National Health and Welfare, particularly with the increasing specialization required of our personnel. Costs of personnel training and development today are a sizeable portion of the Department's operating expenses, and there is every reason to believe that in the future, they will increase with the growing appreciation of the need for training and career development systems.

It is planned, and the Personnel Administration Directorate organized its Manpower Planning Division in 1967-68 to more closely relate recruiting of personnel with career development plans and training programs. Careful thought has been given to the "total system concept" in recruitment, development, and training, and because these functions can no longer be organized on a

piecemeal basis by unqualified personnel, the Manpower Planning Division has been organized to effect a total system concept in planning and organizing the Department's manpower resources. The manpower plan of the Department can be expected to evolve from the Department's Program Review (financial plan). When, each year, the future staff requirements of the Department become known, the resources of the Manpower Planning Division will be utilized to co-ordinate the placement, training, and career development of the human resources of the Department to enable the Department to provide competent managerial personnel for its continuing operation. One significant aspect of manpower planning is the "management inventory" currently being developed, which will consist of a record of the personal qualifications of Departmental personnel, a record of their career and development interests, and a record of their work performance. It is in the storage and retrieval of this information that the Personnel Administration Directorate will take advantage of technological change. Automated information systems will enable the Directorate to respond without delay to virtually all staffing requests made by Departmental management. Today, with insufficient and sometimes disorganized personnel data, selection by manual methods may be slow and ineffective, failing to reveal the qualified personnel who may exist in the Department unknown to the searching organizations. This is contrary to the objective of the Directorate to provide the most qualified individual available for any given position.

17.2.2.2

Use of Behavioral Science Research

Improvements in the Personnel Administration Directorate effectiveness can be expected as knowledge arising out of research into human behaviour is applied. Social scientists have been engaged in behavioural science research for the past several years and some of the theories which have been developed are being successfully implemented. Indicative of the type of research which has been conducted, and which the Department is carefully considering in terms of its organizational development is the Managerial Grid, which was developed by Doctors Robert R. Blake

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and Jane S. Mouton of the University of Texas*. The Managerial Grid is a systematic approach, based upon scientific research, for mobilizing human effort and obtaining the maximum performance results of which people in business life are capable. It is a tested system which has been applied in industry and which in each case has contributed significantly to improved business results.

17.2.2.3

Introduction of Pilot Projects

Pilot projects are being initiated to introduce a new managerial process in the Department. The process has been termed "Management by Integrated Planning and Evaluation", and will incorporate in it the features outlined in the preceding section of this Brief under Research. Managers at each organizational level will play key roles in goal setting, work planning, and the evaluation of results achieved. This approach, instead of creating additional managerial work, is expected to create a more systematic and integrated effort by all program directors working in concert to attain pre-determined goals. Primary emphasis will be given to the role that each manager must play in identification of the essential work required to support his organization's objectives and goals, organization and assignment of this work into positions that are logical to the incumbent and his peers, and control of this work while in process, to provide assistance when needed, and to ensure timely completion.

17.2.3

Extra-mural aspects: Need for Health Manpower Studies Program

17.2.3.1

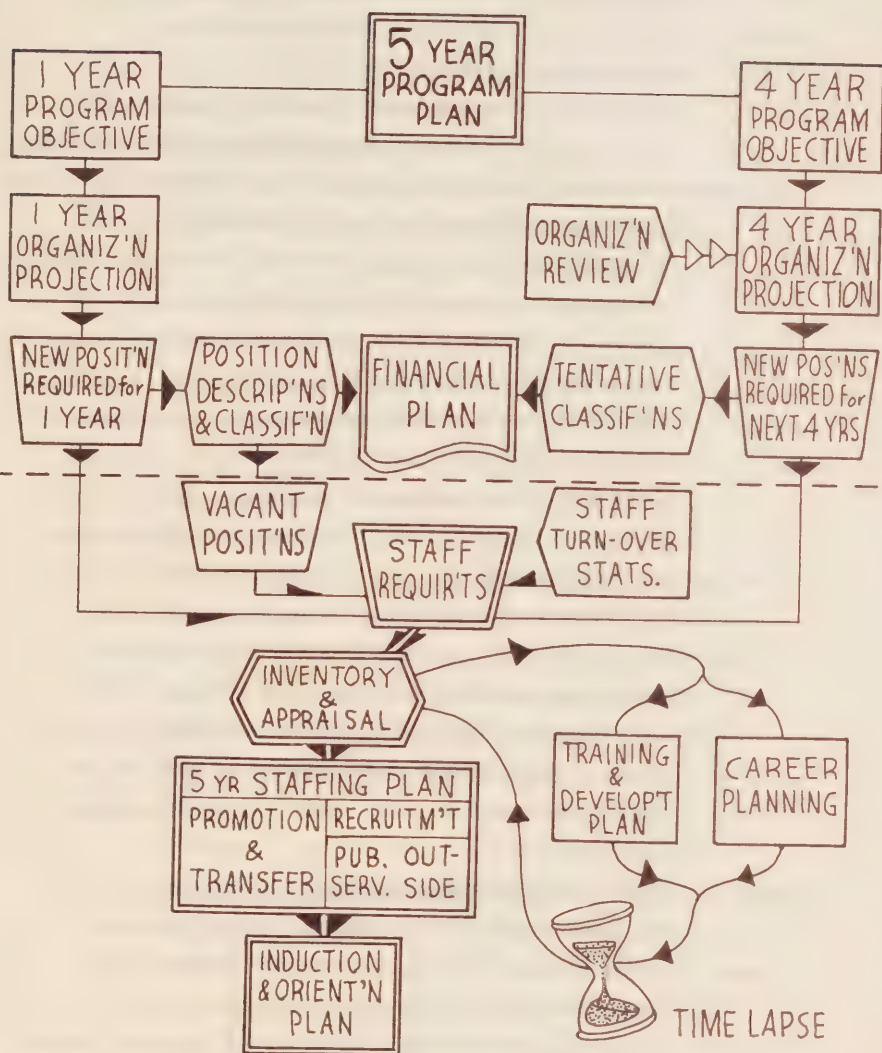
Introduction

In this section the expression health manpower includes all professional or university trained manpower such as physicians, dentists, pharmacists, nurses and those educated in the basic medical sciences, all manpower variously referred to as allied health manpower, paramedical manpower, paradecimal manpower and personnel working in occupations associated with the health professions. Within this broad spectrum there are, of course,

* The Managerial Grid, Robert R. Blake, Ph.D., & Jane S. Mouton, Ph.D., Department of Psychology, the University of Texas, Austin; Gulf Publishing Company, Houston, Texas - 1964.

PROGRAM REVIEW

MANPOWER PLANNING



scientists and technicians as defined elsewhere in this Brief. The health manpower studies program will be concerned with scientists only insofar as they are needed for future health services.

17.2.3.2

Background Information

In its report on the existing and future health needs for the people of Canada, the Royal Commission on Health Services anticipated a continuing increase in the demands for health services and expressed grave concern over current and impending shortages of health personnel to meet them. Special studies had provided the Commission with data on many aspects of present and future supply of health manpower. The MacFarlane Study, for example recognizing the need for more physicians, stressed also the urgent need for research on health manpower requirements and supply, to be co-ordinated by an agency which would "maintain an overall view of the many interlocking factors that shape the health requirements of Canada as a whole" and to "keep a constant vigil on the changing forces that determine the supply of health manpower". As a consequence, the Royal Commission recommended various financial and other measures to increase the supply of health personnel and for research into health manpower requirements and supply. Various other studies and Commission reports have also expressed concern over health manpower shortages and the need to study the most effective and economical means to meet the demands for health personnel.

17.2.3.3

Factors contributing to shortages of health personnel

Many factors contribute to the shortage of health personnel, (including scientists). Increased demands for services have resulted from population increases, rapid growth in health insurance, greater affluence, proliferation of government programs, more effective health education of the public and many other such factors.

Along with this universally recognized need for health manpower in all categories, there is a growing conviction that it is unlikely that the supply of health personnel will ever be adequate to meet the demands for comprehensive health services.

The need, therefore, is to study methods for not only improving the recruitment and production of health personnel but also to relate this supply to effective distribution of services, improved productivity and utilization of health personnel, training of new categories of health workers and other related measures to more effectively meet the demands for services.

17.2.3.4

Scope of health manpower planning

Health manpower planning is complex and involves overlapping relationships with many fields of interest, for example,

- national and regional manpower planning,
- immigration policies,
- health care systems,
- education and training of health personnel,
- financial support programs,
- health legislation,
- government policy.

Studies on which such planning is based are no less complex and require the designing of a study framework which will keep the aims of the studies program in proper perspective at all times. Such a framework would need to consider all factors relating to the present and future supply of all categories of health personnel and relate them to an evaluation of the present and future demands for health services with a view to balancing supply and demand. Such studies must also consider where responsibility should most effectively lie for improvement in the supply, training and utilization of various categories of health personnel. Recommendations arising out of these studies must specify actions necessary to improve the supply of health personnel, and should indicate where responsibilities for implementing such action should lie individually or collectively. They must specify also the financial, social, economic and administrative costs involved in their implementation. Alternative actions and responsibilities and their implications must also be recommended. Clearly some studies must precede others. Study priorities as well as priorities for action will also be developed in order to facilitate decisions on planning goals.

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This complex program requires a study team to co-ordinate and conduct the studies and to develop the recommendations. The study unit will examine work already done, but needing updating, and correlate it with current and future studies by interested associations and agencies concerned with health manpower planning. These studies will need to be related to similar work being done by national and regional agencies, both government and private, concerned with overall manpower requirements in all fields.

17.2.3.5

International Aspects

There will also be a need for co-ordination and co-operation with international agencies (for example W.H.O.) and health manpower planning agencies of other countries to establish immigration, educational and other relationships and policies.

17.2.3.6

Conclusions:

(1) The health manpower studies program of this Department is, therefore, aimed at conducting and co-ordinating studies with a view to developing practical and positive recommendations for actions to improve our human resources in the health fields by defining the measures necessary to improve the quantity, quality, distribution, productivity, and utilization of the resources in health manpower, to meet the demands for comprehensive health services for all Canadians.

(2) The training of health scientists pose several problems of a complex nature. It is believed that these can be solved with the resources available namely:

- (a) Capital funds available to create more health education and research facilities.
- (b) Assured funds available to bear most of the operating cost of these facilities.
- (c) The existence of a federal provincial organization to conduct long-term planning in this field towards the achievement of national goals.

Manpower Requirements, Welfare

Future requirements for manpower in the social welfare or social sciences sector are related to the present and future uses of such personnel in the provision of traditional and new functions.

These include individual and group counselling services, within welfare agencies, participation in social planning and social policy consideration, part in community development counselling and consultation in the educational system, the correction system, the health system and in industry of the future, the administration of statutory and voluntary welfare and social service programs, teaching in graduate undergraduate community college and technical schools of social work and social welfare, teaching in interdisciplinary settings e.g. Health Sciences Complexes, consultation to other fields, and applied social research.

The matter is receiving urgent attention from a number of sectors. Our department is vitally concerned and through the Welfare Assistance and Services Directorate and Research and Statistics Directorate close co-operation is maintained with the Universities, Colleges and Schools, the professional associations, the voluntary agencies and national committees devoted to the assessment of requirements, resources and utilization of personnel. The rapid expansion of training facilities has made heavy demands on the service of the Department's Consultant in Welfare Training.

17.3 Departmental Contribution Toward Rational and Efficient Use of Existing Statistical Resources

17.3.1 Statement of the Problem

The complexity and magnitude of the problem posed to the producers and users of statistics in the absence of uniformity of the methods, forms and definitions used by local, provincial, national and international agencies was well stated by both the Glassco and the Hall Commissions.

17.3.2 Conceptual Approach

The acceptance of the concept of a co-ordinated system of statistics now seems not only essential but also feasible. Statistical units of the Department, insofar as they are concerned with comprehensive data collection on a regular basis, are conceived as a component of a broad statistical system involving local, provincial, federal and international agencies organized as a co-ordinated network of units designed to meet the specific and changing needs of users of statistics from various sources. This conceptual approach is of prime importance since responsibility for developing and promoting the standards and methods to be used is shared between different levels of governments, with federal agencies having the primary responsibility.

17.3.3 Co-ordination and Operating Policies

Within the terms of reference of existing legal requirements, and in line with the relevant recommendations made by the above-named Royal Commissions, the Department seeks to co-ordinate its statistical services with statistical services operated by other departments of the federal government, particularly with the Dominion Bureau of Statistics and the Department of National Revenue.

In certain cases where centralization of statistical capability is advantageous, (i.e. where certain categories of services are already provided and qualified staff and facilities are available), the Department recognizes the primary responsibility of the central statistical agency, the Dominion Bureau of Statistics. For example,

this could apply to large-scale collection and routine descriptive tabulation and analysis of annual statistical series. Early joint planning to meet the needs of both agencies is essential in such cases, as was done in the field of hospital statistics through the Advisory Committee on Hospital Insurance, its Sub-committees and Working Parties.

On the other hand, there are cases where centralization of statistical capability has certain disadvantages. Frequently data collected for broad general purposes lack the specificity that may be needed in solving a particular research problem. It is not always feasible to meet a wide variety of needs, some with quite divergent aspects, by one data-collection system. Where answers to specific questions are needed, centrally-collected data may not always be able to provide them. Different definitions, different standards, and different statistical methods may be needed from the ones normally applied for routine data collection. In such cases, the departmental statistical service must be available to apply statistical methods to obtain the needed answers in the appropriate way.

However, duplication of effort is avoided by attempting first to obtain whatever data is needed from the central statistical agency. For example, extensive use is made of census data, population projections, and vital statistics in many research projects. Such data are used in developing models and in testing projections of program costs and coverage. Public expenditure data and industry and labour statistics are extensively used also for expenditure studies, manpower studies, and studies of the cost and distribution of drug products. Wherever possible DBS resources are used for such purposes. However, a recent review of the resource data for health and welfare manpower planning revealed serious limitations in the use of census data. Until after the 1971 census, no more recent data than that from the 1961 census will be available, which is of little use for manpower planning purposes. Recently expanded Department of Manpower surveys of technical and professional

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personnel have been limited, insofar as they cover health and welfare manpower, to social workers, psychologists, and food technologists, and the roles of such personnel in the health and welfare fields are not clearly enough identified for departmental planning purposes. The Departmental statistical services must therefore supplement the data obtained from these sources by whatever means there are available. For example, in the past, periodic mail surveys have been conducted to determine the supply and distribution of physicians in Canada.

In the field of hospital care, both DBS and the Departmental statistical service have assisted the provinces in developing uniform morbidity statistics. DBS in the past have published comprehensive statistics on hospital morbidity by province and by diagnosis, and have produced New Brunswick statistics. Unfortunately the latest information they have produced relates to 1964, and they have indicated they are unable to proceed with further morbidity statistics at the present time. Departmental staff collate into national tables the provincially-prepared standard tables on hospital morbidity, which are published annually as Hospital Morbidity Statistics, and assist the Yukon and North West Territories each year in producing their standard tables. This year our staff had also to prepare the New Brunswick statistics, and will in future have to prepare some additional provincial data to up-date the annual report on hospital morbidity. A number of research studies on trends in some of the major areas of morbidity are contingent upon up-to-date statistics of hospital morbidity.

DBS resources are also used where possible for education statistics and for consumer finances. Unfortunately, the consumer studies are of limited use for regional planning purposes because of their very slender base. Such data have to be supplemented from other sources in order to provide adequate support for departmental policy in the income maintenance field.

As for special surveys, we have made some use of the Labour Force

Survey to obtain socio-economic data for planning purposes. Useful data were obtained on provision for care of children by mothers employed in industry. Information on current smoking habits was examined. A study is now under way on the extent to which dental services are provided. However, our other research has indicated that the degree of accuracy of such data is not sufficiently reliable to provide for departmental planning in this area.

In summary, effective use is made of DBS socio-economic statistics within the limits of timeliness, applicability and relevant detail that prevail. DBS statistics may serve as substantiating background data to more detailed information collected directly from other sources. Since DBS must satisfy customers whose interests and demands are quite different from those of this Department, DBS field surveys often lack the specification and precision we require in data to be used for planning our health, welfare and social security programs.

17.4

Standards

With its scientific resources and its international contacts, the federal department is in the best position to establish minimum standards in the fields of health, welfare and social security, based on scientific considerations. Whether or not these standards are implemented by the provinces depends on both the extent of the resources available to them and the provincial scale of priorities to which the standards must be related.

PART FOUR

NATIONAL SCIENCE POLICY
and
CONCLUSIONS

18. NATIONAL SCIENCE POLICY

18.1 Introduction

"Nations can learn a great deal one from another by an exchange of ideas and information, but in the final analysis, each must formulate its own policy."

O. Solandt

Science policy has been defined as an articulated course of action related to concern about the growth of science itself, and provision for the rapid, deliberate application of its fruits to human welfare. All modern nations are conscious of the need for a national policy for science to provide guidance in how to allocate funds, manpower and other resources in the face of continuing and escalating demands for support from universities, scientific institutions, individual scientists, graduate students, national voluntary organisations, international scientific organisations as well as from consumers of science. Resources must be rationally apportioned in the continuation of basic and applied research, development innovation to encourage fruitful exploitation of knowledge without at the same time drying up its fundamental sources.

18.2 Recent Developments

Canada is no exception to these general trends. It has made considerable efforts towards the development and formulation of a national science policy in recent years and our Department has witnessed with great interest the most recent initiatives taken by the Federal Government in this particular field.

The establishment of the Science Secretariat and later the Science Council of Canada has filled a need which had been felt for some time and the Federal Government is gradually developing the capability to assess the broad and complex problems of science and technology in Canada and abroad. These agencies have already assumed a major role toward the coordination of scientific and technical information in Canada and the recent publication of the report made public by the Science Council of Canada entitled "Towards a National Science Policy for Canada" is evidence of the strategic

role which that body is already fulfilling in the fields of science and technology.

Our Department has been associated with the Science Secretariat in the pursuit of some of its activities (departmental participation to studies conducted by the Science Secretariat and the Science Council of Canada) and the experience thus gained has been useful in promoting our own scientific programs.

18.3 Review of Report #4, Towards a National Science Policy for Canada issued by the Science Council of Canada¹

This concise report which has just been released is intended "to lay a firm foundation for the evolution of a comprehensive national science policy for Canada".

We have read this document with great interest and we are circulating it to appropriate officers of the Department to obtain their views regarding its practical applications in connection with the future scientific activities of this Department.

18.4 Departmental Review of National Science Policy

18.4.1 Background

Within the limit of staff and time available, the Department has made a review of the existing literature relating to national science policies as practiced in a number of countries, including Canada, and has come to the conclusion that there is no uniform pattern in existence insofar as national science policy is concerned.

18.4.2 Conceptual Approach

National Science Policy can be regarded as a total system, i.e. a body of interconnected parts, not yet fully rationalized, but performing mutual interacting and interdependent functions related to a common purpose, namely the most efficient and effective application of science to the solution of economic and social problems that arise in the pursuit of the nation's goals.

¹ Science Council of Canada, Report No. 4, Towards a National Science Policy for Canada, October 1968, Queen's Printer

18.4.3

Organization Components and System Functions¹

Requirements of that system may be considered in the following terms:

1. The National Policy-Making Body for National Science Policy.
2. Organizational and functional elements concerned with the planning and conduct of scientific activities.
3. Supply of manpower, facilities and money.
4. Supply of scientific and technical information.
5. Machinery for review mechanisms
 - a) budgetary control
 - b) evaluation purposes
6. Machinery to coordinate international science activities.

18.4.3.1

National Policy-making Body for National Science Policy

This is essential to establish a national science policy. This responsibility has already been assumed by the Prime Minister's Office and the Cabinet.

- (a) A preliminary statement of National Science Policy for Canada has already been expressed in the form of Statutes enacted by Parliament for the establishment of the Science Secretariat and the Science Council of Canada.
- (b) More recently, a policy statement in the form of a motion, was issued by the Honourable Maurice Lamontagne, P.C., Chairman of the Senate Committee on Science Policy in the Senate Chambers on the occasion of reconstituting this Committee on September 17, 1968. This statement "emphasized applied research to problems of environment, human resources, housing, natural resource development, northern development, water pollution, space telecommunications, transportation, transmission of energy, and nuclear energy". It also stated that "by 1975, the goal is that Canadians will spend about \$2 billion a year on research and development, both private and public and that a greater percentage of government funds will be directed to private, applied research".

18.4.3.2

Organizational and Functional Elements Concerned with the Planning and Conducting of Scientific Activities

Under the existing administrative arrangements, the planning and

¹ Science Policy in India, A. Rahman
Decision Making in National Science Policy. CIBA Foundation, Churchill Ltd.,
London W.1, 1968

and/or conduct of scientific activities may take place at three levels of organization, namely:

- (a) at the departmental level (or institutional level for agencies conducting sponsored research);
- (b) at the interdepartmental or interagency level; and
- (c) at the national level.

18.4.3.2.1 Departmental or Institutional Level

At the departmental level (or institutional level for sponsored research), the selection of the research topic, the organization of research projects and the allocation of funds take place. The actual conduct of scientific research may also take place. As already mentioned earlier in this Brief, there is a need at that level for more systematic scientific and technical information relating to research and development conducted by other federal government departments and agencies sponsored by these agencies. Two categories of information are needed:

- (a) at the performing level, recorded descriptions and results obtained from research and development activities are needed by scientists;
- (b) at the management level, resources information must be available in sufficient depth or detail to allow analysis of specific areas of support and manpower-availability in assessing existing investments for comparison with project needs and future goals.

18.4.3.2.2 Interdepartmental or Interagency Level

At the interdepartmental or interagency level problems of coordination between organizations working on complementary problems need to be resolved.

The agency may also act as a channel of communications and a two-way filter between the institutional level and the national level. The provision of resources information is particularly needed at this level.

18.4.3.2.2.1 Existing Interdepartmental Advisory Panel on Scientific Policy

With the continuing growth of scientific activities and the greater use of multidisciplinary groups to undertake major programs, it is

believed that the existing interdepartmental committee structure needs expansion to ensure a broader look at problem areas than can be accomplished by any single Department and to ensure that the particular interests of the various Departments do not result in biased governmental programs in various scientific areas.

18.4.3.2.2.2 The Concept of Major Programs

The Science Council of Canada has proposed in its last Report that most new undertakings in Canadian science be organized as large, multidisciplinary, mission-oriented projects having as a goal the solution of some important economic or social problem and in which all sectors of the scientific community must participate on an equal footing. The Report refers to these initiatives as major programs.

The Department endorses this proposal designed to direct the development of science and technology in Canada. Furthermore, it is very much in agreement with the "systems approach" suggested involving the systematic and rational analysis and design of an object or policy, in which every possible effort is made to ensure consideration of all reasonable alternatives and in which attempts are made to provide objective quantitative measures of the consequences of alternate courses of an action as a basis for decision.

18.4.3.2.2.3 General Principles Governing the Future of all Federal Government Scientific Organizations

The Science Council of Canada has also recommended principles for the future direction of the Federal Government scientific organizations. We not only endorse but to a very great extent already practice principle #1 which broadly states that "Federal Government scientific organizations be mission-oriented, engaged principally in applied research and development transfer to industry at the earliest possible stage, development likely to give rise to marketable products."¹

¹ Science Council of Canada, Report No. 4, Towards a National Science Policy for Canada, October 1968, Queen's Printer

We trust that our Brief has amply demonstrated that we actively apply principle #2¹ fostering the growth of scientific activities and active collaboration with industry and university groups. As stated earlier, we are working towards the achievement of increasing internal flexibility as envisaged in our manpower and management sections of the report and we have already stated that fundamental research, while not pursued per se, is a sine qua non accompaniment of any good research carried on in the Department. The Department has by and large been adhering to these general principles in the past, as may be seen from the description of our departmental research activities made earlier in this Brief and is in agreement with them.

18.4.3.2.3 National Level

At the national level planning activities includes the setting up of organizations for studies necessary for the development of science policy, the establishment of priorities for different sectors of research and the allocation of resources to meet national objectives. These responsibilities have been assumed in part by the Science Council of Canada and the Science Secretariat whose main duty is the comprehensive assessment of Canada's scientific and technological resources, requirements and potentialities under the terms of the Science Council of Canada Act.

18.5 Supply of Scientific and Technical Information

All levels of administration must rely heavily on a well-organized and effective scientific and technical information system which can provide adequate, accurate and timely information on the basis of which decisions may be reached. We consider this resource as one of the most essential requirements of a National Science Policy.

18.6 A National Scientific and Technical Information Network is Urgently Needed

One of the most urgent requirements which needs to be met to lay a firm foundation for the development of a national science policy for Canada is the establishment of a national scientific and

¹ Science Council of Canada, Report No. 4, Towards a National Science Policy for Canada, October 1968, Queen's Printer

technical information network. Such a network should eventually include the major operation functions involved in the communication of scientific and technical information such as management, organization, activities, processes and services. A national system would have the responsibility to see that all qualified users connected with national science policies are served effectively. In this connection, we note with interest that the Science Secretariat has already undertaken, at the request of the Science Council, a study of scientific and technical information in Canada. Our Department has been associated with that project and is looking forward to the results of that study.

18.6.1

Recommendations¹

It is recommended that

- (1) a nationwide information network for the orderly development of scientific and technical information embracing all sciences be established as soon as feasible in Canada;
Our Department is particularly interested in such a development as it is in the process of establishing its own nationwide information network relating to health and welfare and which has been conceived in such a way as to become part of a nationwide information network embracing all sciences if and when this materializes;
- (2) a government-wide clearinghouse capability be established when feasible to handle information regarding currently planned and active research and development efforts. All Federal Agencies supporting research and development should be directed to
 - (a) maintain comprehensive, up-to-date indexes of their own current research and development efforts; and
 - (b) provide prompt and appropriate information about those efforts to the clearinghouse for correlation and authorized dissemination;
- (3) a government-wide clearinghouse capability for documents reporting the results of research and development supported by the Federal Government and Crown Agencies be established;

¹ Scientific and Technical Communication in the Government,
U.S. Department of Commerce. 48474

- (4) a government-wide clearinghouse capability for retrospective search and retrieval services of Federally-supported, organized collections of scientific and technological information be established when feasible;
- (5) there is also a need for the establishment of a government-wide clearinghouse capability for coordinated access to Federally-supported specialized information centres and services. The jurisdiction of these government-wide clearinghouses could be extended to and include academic institutions and industries if and when feasible at a later date; and
- (6) the Science Council of Canada in consultation with science-based agencies, universities, industry, review, update and apply to Canadian requirements the O.E.C.D. Proposed Standard Practice for Surveys of Research and Development, 3rd revision. These could then be adapted in cooperation with O.E.C.D. for Canada's participation in international comparative studies.

18.7

Supply of Manpower

It is noted that the Science Secretariat has already initiated manpower studies of qualified scientists and engineers in Canada. It is also noted that the Science Council of Canada is in the process of organizing further studies by discipline of the manpower now in training and to have realistic forecasts made of the expected supplies of the various specialists.¹ The Department of Manpower and others have also initiated manpower inventories. There is a need for coordination of studies to avoid unnecessary duplication and ascertain that balanced attention to the various scientific disciplines and professions is given.

18.8

Policy and Manpower Training

Science policy and educational policy must be integrated or at least made consistent with one another. It has been clearly established that in the long-term, the health and vitality of Science must depend upon a continued increase of well-qualified candidates from the schools into science and technology places in the universities, the government and industry.

¹ Science Council of Canada, Report No. 4, Towards a National Science Policy for Canada, October 1968, Queen's Printer

Forecasts of net additional requirements of university graduates in industry, schools and colleges, higher education and research, government, should be fairly accurate and made available sufficiently in time to allow students and training institutions to make effective choices and provide useful guidance.

18.9 Machinery for Review Mechanisms

18.9.1 Budgetary Control

There is a requirement for budget-making machinery to devise procedures for allocating funds to the various sectors of science under uniform conditions as much as possible and establishing where feasible consolidated budgets for science. This responsibility has been assumed by the Treasury Board.

18.9.2 Evaluation Process

With the growth of organization machinery for research and the increasing financial investment in research, comes a growing need for a reviewing policy and program and evaluating the quality of research activities. To be useful such a review and evaluation needs to be continuous and give constant feed-back to policy-makers. The machinery for review and evaluation depends also on the existence of an effective scientific and technical information system.

The Science Council has recommended that all of the scientific programs of government be subject to a "regular technical audit. The Department has reviewed this proposed recommendation and is in substantial agreement with its content.

18.10 Machinery to Coordinate International Science Policy

This responsibility has already been assumed by the Science Council of Canada, the Science Secretariat and the Department of External Affairs.

Knowledge is essentially universal and we believe that the concept of a national science policy should include consideration as to how Canada might best be able to assist others with the development of science and technology and also on sound operational planning to determine the most appropriate procedure or form of organization to implement such policies. The Department's role in international

scientific activities have been described earlier in this Brief under the relevant parts devoted to this topic. An extensive network of international relations has been established to exchange information, personnel, to undertake joint research programs or to give or receive scientific aid. Our Department may be expected to play an increasing role both through the international agencies and bilateral agreements for technical and scientific assistance.

Periodic evaluation of operational projects is likely to remain the most practical tool to measure the effectiveness of scientific activities conducted under these programs.

18.10.1

Recommendation

It is recommended that a clearinghouse containing data and case studies on Canada's international scientific activities be established by a central agency concerned with the overall planning and coordination of scientific and technical activities in international commitments.

18.11

Scientific Management- Recommendation

As reported in this Brief, the Department is gradually introducing a new management process.

Program directors have been making extensive efforts to increase efficiency through concentration on the Department's most important work by a project priorities system, organizational changes and a variety of other approaches developed within smaller decision-making units.

The increased government's role in science and the growing number of government sponsored research agencies is rapidly creating a need for scientists who are both qualified in technical subjects as well as elements of scientific administration.

18.12

The Role of the Social and Behaviourial Sciences in Science Policy

Applied social research has developed in relation to social policy within the Department. Officials in executive, administrative and research posts have been drawn from fields such as economics, social works, sociology and psychology. There is a close working relationship between the administrators and the research workers

when social programs in Canada and abroad are being assessed or when new programs or proposals are being developed.

There are a number of ways in which social scientists in the Department have been able to contribute to public policy. These include:

1. Research concerned with specific policy problems at the national level. For example, the policy proposal put forward by the Senate Committee on Aging was studied in relation to other guaranteed income approaches and the concept was developed in the form of the Guaranteed Income Supplement for old age security pensioners which was subsequently approved by Parliament. Research services of the Department were provided to the Joint Parliamentary Committee on Old Age Security in 1950 and to the Joint Parliamentary Committee on the Canada Pension Plan in 1965.
2. Research concerned with specific policy problems at the international level. The Deputy Minister of National Welfare and senior officials have served on Expert Committees of the International Labour Organization, the World Health Organization, the Commission on Social Development and the Economic and Social Council of the United Nations in the development of social policies at the international level.
3. Research concerned with the general character of social change. There is need to give greater attention to socio-economic, sociological and psychological aspects of change and their impact on social policy. It may be possible to direct some of the research activity of the Research and Statistics Directorate and some of the resources of the National Welfare Grant Program to this end.
4. Research related to the evaluation of existing and proposed policies. There is a need for a more systematic use of research as a tool for evaluating social policies. Cost-benefit analysis are helpful in some situations; the development of statistical measures and indicators combined

with an assessment by an experienced social scientist is useful in other situations. For example, the Department can carry out research using the computer as an aid to analysis to determine the nature of the options that would pertain if a universal flat rate benefit, such as family allowances, were made a selective payment payable on the basis of income.

5. Research related to the execution of social policy.

It is hoped that the research activities of the Department can be extended in this field. For example, there is scope for federal provincial co-operation with respect to research in the field of public assistance.

Social policy research in government has tended to be related to program research rather than to social security or to the social development system as a whole. Greater co-ordination in social research activity will result in a broader and more balanced approach in the development of social programs.

19.

CONCLUSIONS

Our Brief has sought to demonstrate that science permeates practically all units of the Department. This deep involvement with science must not only be maintained but strengthened over the next few years to meet problems arising from changes in the physical and social environments if the Department is to carry out its fundamental mission properly. Any withdrawal from a scientific outlook and approach to problems would inevitably lead to deterioration of the quality of service provided by the Department to the Canadian people.

To cope with these problems, departmental programs are being continuously strengthened or new programs are being developed to meet the most pressing demands. Both short and long term planning are carried out to make the maximum and most effective use of resources available.

It is hoped that scientific activities will be maintained at a level:

- (1) to enable them to meet demands arising out of growing population and social change;
- (2) to permit and encourage flexibility to alter program in response to changing requirements; and
- (3) to undertake the research needed to define with precision disease entities.

19.1

Science Policy and Manpower

There is a need in Canada for a comprehensive program to improve the quantity, quality, utilization and productivity of health and welfare manpower now and in the years ahead.

19.1.1

Actions Taken

In the health field, the Federal Government, through our Department, has recognized this need by establishing a number of major health programs such as the Health Grants Program, the Health Resources Fund, the Fitness and Amateur Sport Program, to name only the principal, to meet the demand.

The matter of future requirements for manpower in the social welfare and social sciences sector also require urgent attention. Our Department has been vitally concerned in this matter and has directed efforts through the Welfare Grants Program, the Canada Assistance Plan and the Research and Statistics Directorate. These include material assistance, consolidation and cooperation extended to the universities, colleges and schools, professional associations, voluntary agencies and national committees devoted to the assessment of requirements, utilization and retraining of manpower in these and related fields.

19.2

Future Departmental Requirements

Insofar as the administration of scientific personnel of this Department is concerned, it is anticipated that changes in technology will have a major effect upon the means by which the responsibility for Recruitment and Selection, Manpower Planning, Training, Staff Relations, Classification and Pay Administration and General Personnel Services are discharged.

There is every reason to believe that the costs of personnel training and development will increase with the growing appreciation of the need for training and career development systems.

The Manpower Planning Division has been organized to effect a total system concept in planning and organizing the Department's manpower resources, which can be expected to evolve from the Department's Program Review (financial plan).

To achieve that objective, the Department is planning to make greater use of automated information systems for "management inventory". It is also planning to make greater use of behavioural sciences for mobilizing human effort and obtaining the maximum performance.

Finally, as a pilot project, it is introducing a new managerial process designed to create a more systematic and integrated effort by all program directors working in concert to attain their pre-determined goals.

19.3

Federal-Provincial Collaboration in Matters of Health and Welfare

In our Brief, we have attempted to demonstrate how through the Dominion Council of Health and its Advisory Committees, through the Health Grants Program, the Hospital Insurance Program, and more recently the Canada Assistance Plan and others, a variety of mechanisms have been developed for close collaboration, consultation and where applicable coordination of effort with the provinces. Ministers must have access to the best possible advice in deciding policy questions. Advisory councils and advisory committees composed of experts and well informed laymen from across the country have been of inestimable value both in providing information and supporting the Department to formulate policy, in providing feedback on the provincial impact of policies and in improving standards of administration by joint participation in problem-solving with senior officers of the Department.

Whatever guidelines are developed for future collaboration arising out of constitutional or fiscal considerations, in the matter of health and welfare it is to be hoped that future practices will take cognisance of the degree of collaboration already achieved and proceed to improve, extend and consolidate this level of collaboration.

19.4

Coordination and Cooperation

No nationwide forecast of science policy can be envisaged which relies on the piecemeal approach in pursuit of objectives of multiple agencies which are entirely independent of one another. The inter-dependence of all agencies within the Health and Welfare system has in the global sense become abundantly clear. It remains to work out the vital points of intersection of interest for more rational approaches to the whole system. Nevertheless, this should not be interpreted as a plea for over-centralization. This continent has operated on a more or less unstated premise of multiplicity with a purpose. One can have a system which opts for integration when necessary, cooperation and coordination as required and informal sharing where this is the best approach

towards the attainment of mutual goals. The two extremes of a chaotic jungle at the one end and over-centralized control at the other are generally seen as undesirable. The guidelines for coordination of effort and the articulation of the frame of reference for science policy which is anticipated from the Senate Committee should do much to facilitate the planning for the future.

Finally, it should be remembered that science is a developing organism which grows and accumulates forever. Therefore, it must be expected that the problems of science policy will continue to be with us indefinitely. Some of them will be solved. Others perhaps even more complex are likely to replace them as a result of the irreversible evolutionary process of our society and its inevitable impact on science and technology. They will require the long-term cooperation of all agencies concerned with investments in scientific activities, namely the individual scientists, educational institutions, industry and governments who must pool their resources towards the solution of economic and social problems for the benefit of mankind.

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VOLUME II

13. Research Output Related to Departmental Scientific Activities
13.1 General Comments

The following volume is devoted to the Research Output of our Department as requested by your Guideline.

This inventory and text, while comprehensive and detailed, is not exhaustive. To facilitate reading and review we have provided a general index as well as introductions to the various sub-sections.

Because of limited resources and time, and the range of specialized topics and details entailed, despite care, meticulous editing was not possible and we regret any errata or inaccuracies which may appear in this volume.

13.2 RESEARCH OUTPUT

13.2.1 Patents13.2.1.1 Regulations under the Health Grants Program

Among the various special provisions applicable to the Health Grants Program is a provision relating to patents:

(a) Canada shall be deemed to have an interest in any invention, discovery or improvement, and in any patent or patent right in respect thereof, resulting from work done wholly or in part with funds derived from a grant-in-aid for research.

(b) The principal investigator and the sponsoring agency undertake to make any such inventions, discovery or improvement known to Canadian Patents and Development Limited, and, for the purpose of continuing titular control and administration of any such patent or patent rights, to see to such assignment thereof as that company may require; and Canada, the inventor and the sponsoring agency shall together determine their respective rights therein.

(c) Subject to the above, nothing herein contained shall be deemed to prevent Canada or the inventor from conducting searches to determine the patentability of any such invention, discovery or improvement, or the inventor, through or with the consent of the Canadian Patents and Development Limited, from applying for patent thereof in Canada or elsewhere.

The above policy has come under recent review and discussion in our department since M.R.C. and other granting bodies do not have a comparable policy.

13.2.1.2 Patents Arising from Research Activities Supported under the Health Grants Program

Under the Public Health Research Grant, to our knowledge, one patent has been issued "Anti-Tuberculous Compounds and Methods of preparing same" (inventors are Messrs. Siebenmann and Zubrys). It is held under an agreement in the year 1964 between the Canadian Patents and Development Limited and the University of Toronto. The Canadian Patents and Development Limited may decide that an application does not justify the costs involved in sponsoring searches for the purpose of securing patents. The department is then advised and has the option of undertaking to assume the cost of further

action by C.P.D.L. Alternately, the issue may be dropped or C.P.D.L. may enter into negotiations with the inventor to waive Crown interests in the invention.

- 13.2.1.3 Our Department has been invited by C.P.D.L. in instances where a discovery may have low priority or high cost implications for industry to accept contracts from C.P.D.L. for the development of inventions arising from research which may originate in our own laboratory or elsewhere. Our policy is that such development work would be considered on inventions coming within our sphere of competitors contingent upon limitations of staff, money, space and time.

- 13.2.1.4 The current patents held in pending, arising out of discoveries in our laboratories, are described on the following page.

CANADIAN PATENTS AND DEVELOPMENT LIMITED

INVENTIONS RECEIVED FROM DEPARTMENT OF NATIONAL HEALTH AND WELFARE

FOR FISCAL YEAR ENDED MARCH 31, 1968

Isolation of Antibodies	B. Rose L. Gyenes A. H. Sehon	Canadian Patent No. 625,355 LICENSED TO; Ortho Pharmaceutical of Canada Limited
Gamma Irradiation of Virus Suspensions	J. R. Polley	Canadian Patent No. 660,388 U. S. Patent No. 3,259,546
Vaccines	L. Greenberg M. Y. Cooper	Patents in France, Denmark, Belgium and U. K. Patent applications pending in Canada, U. S. A., U. K., Germany, Sweden, Holland, Brazil and Switzerland.
Particle Classifier Centrifuge	J. Leroux	CASES 3125 and 3423 LICENSED TO: Labatt Industries Limited Patent applications pending in Canada and U. S. A. Invention exhibited at Production Show 1965 and Canadian Chemical Equipment Show 1966
Vaccine Preparation using Glycine	L. Greenberg	Patents in Belgium, Romania, S. Africa and Spain Patent applications pending in U. S. A., Canada, U.K., Colombia, Argentina, India, Australia, France, W. Germany, Italy, Sweden, Switzerland, Holland, Japan, Mexico, Brazil, Venezuela, India, Pakistan, Austria, Poland, Czechoslovakia, Denmark, Yugoslavia, New Zealand, Turkey and E. Germany. LICENSED TO: Labatt Industries Ltd. - see Case 3125

13.2.2 PUBLICATIONS

1. Following are lists of publications submitted by those units of the department primarily engaged in intramural research. This does not represent total output. It will be noted that the publications cited for the Laboratory of Hygiene Health Services Branch cover the calendar years 1962 to August 1968, the publications list for the Research Laboratories, Food and Drug Directorate covers the year 1967, the publications list of the Research and Statistics Directorate covers for the most part the years 1962 to 1968, but includes a few publications prior to 1962. The publications prepared in collaboration with other divisions are included and so designated. The Radiation Protection Division, Health Services Branch submitted a cross-section of recently published material.
2. The five departmental periodicals, are listed and briefly described.
3. Pamphlets and booklets produced in the department mainly for public education and distributed by provincial departments are listed by Division and title.

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8. The effect of BCG vaccination on the cutaneous infection of rabbits with Salmonella typhi. B.B. Diena, R. Wallace and L. Greenberg, *Can. Jour. Microbiol.* 1962, 8: 401-403.
9. Experiences in Clinical Chemistry in Canada. R.H. Allen, *The Pub. Health Lab.*, May 1962, 20: 47-50.
10. Studies on the in vitro survival of virulent *Treponema pallidum*. I. Methodology and Basal synthetic medium. G.E. Kimm, R.H. Allen, H.J. Morton and J.F. Morgan, *Amer. Jour. Hyg.* May 1962, 75(3), 339-346.
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12. The use of gamma radiation for the preparation of virus vaccines. John R. Polley, *Can. Jour. Microbiol.* Aug. 1962, 8: 455-459.
13. Serological relationships among the species of *Arthrobacter*. H. Katznelson and Aileen Mason, *Can. Jour. Microbiol.* Aug. 1962, 8: 588-591.
14. Studies on the Production of Wassermann Reagin. Evelyn Fowler and R.H. Allen, *Jour. Immunol.* May 1962, 88(5), 591-594.
15. The Affinity for Monkey Tissue of Five Antibiotics having Erythromycinlike Spectra, L. Eidus, A.C. Maniar and J. Furesz, *Chemotherapia*, 1962, 4: 398-404.
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2. Antibiotics in Canada and their Control. L. Greenberg and K.M. Fitzpatrick, Med. Serv. Jour. Canada (Jan.) 1965, 21(1): 1-43.

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"Canadian Nutrition Notes", a newsletter-type of publication, initiated by the Nutrition Division, processed by Information Services and intended for professionals in nutrition and Allied fields. It is monthly and reaches about 7,500 persons.

"Data from Radiation Protection Programmes" is a monthly report with a limited circulation. It is statistical in nature and provides an index of radioactive fallout across Canada.

"Canada's Health and Welfare", printed monthly except for July and August and mailed free of charge to about 55,000 persons. There are 38,000 English copies and 17,000 French copies printed per issue.

"Canada's Mental Health", a bi-monthly magazine prepared by the Mental Health Division, assisted by Information Services. This is a publication whose readers are mostly professionals in mental health and allied fields. Circulation is about 24,000 in two languages, and international in scope. The magazine has published some 50 monographs, widely used as reference papers.

14.2.2.3

PAMPHLETS & BOOKLETS

Health Services Branch

EPIDEMIOLOGY

- Confidentially ... to Teenagers
- Rabies
- Syphilis and Gonorrhea
- V.D. - What You Should Know

SMOKING AND HEALTH

- Am I an Exemplar?
- A Teenager Looks at Smoking
- Canadian Smoking and Health Program
- It takes More Than Words
- Resource Guide on Smoking and Health for Canadian Teachers

Special Committee

- RX - No Smoking
- Smoking and Health, Reference Book (Canada) -- for professional health workers
- So I'm Living Dangerously

Coloured Posters

- It Might Be Different If You Had Nine Lives
- No Thank You (Male)
- No Thank You (Female)
- Sir Walter Didn't Know
- Toll Road

Black and White Posters

- A selection of 25 black and white posters is available
- CHILD AND MATERNAL HEALTH

- Application of the Principles of Medical Asepsis to Maternity and Newborn Care (The) - a guide for nurses
- Before Baby's Born
- Breast Feeding Your Baby
- Canadian Mother and Child (The)
- *Care of the Premature Infant - a manual for nurses
- *Education for Expectant Parents - a manual for nurses
- How Safe Is Your Home? - a safety check list
- Keep Them Safe
- Posture and Rest Positions for Expectant Mothers
- Protect by Immunization
- Score High for Health - a check list on health habits
- Up the Years from One to Six
- What to Eat Before Baby's Born

Posters

- Protect the Little Child - Kitchen Scene
- Protect the Little Child - Poisons
- Protect the Little Child - Stair Scene
- Protect the Little Child - Swimming Scene
- Early Regular Prenatal Care
- Protect by Immunization
- Score High for Health

CHILD TRAINING SERIES

- Baby Talk
- Bed-wetting
- Brilliant Child (The)
- Building Self-confidence
- Destructiveness
- Discipline
- Fear
- Feeding Habits
- Illness
- Jealousy
- Lying and Stealing
- Nervous Habits
- Obedience
- Only Child (The)
- Parent Education
- Play and Playmates
- Pocket Money
- Preparing Your Child for Hospital
- Preparing Your Child for School
- Sex
- Shyness
- Sleeping Habits
- Stuttering
- Temper
- Thumb Sucking

Recruitment Posters

- Occupational Therapy Assistants
- Psychiatrists
- Psychologists
- Registered Nurses
- Social Workers








DENTAL HEALTH

- Brush Your Teeth the Way They Grow
- Crooked Teeth - Crooked Faces

Special Committee

- Dating the Dentist
- Dental Health Division
- *Dental Health Manual
- For Smiles That Last
- Good Habits for Good Teeth
- Periodontal Disease
- Teenagers Toothtest
- Ten Little People and Their Teeth
- Ten Steps to Dental Health

Posters

- Birthday Once a Year - Dentist Twice a Year
- Brush Your Teeth or Rinse Your Mouth
-  Brush Your Teeth the Way They Grow
-  Brush Your Teeth the Way They Grow
- Choose Food Good for You and Your Teeth (coloured)
- Choose Food Good for You and Your Teeth (black and white)
-  I Brush My Teeth After Every Meal
-  We Want Good Teeth
- How To Brush Your Teeth
- When To Brush Your Teeth
- Why Brush Your Teeth
- The Loss of a Tooth Has Far-Reaching Effects
- Some Foods Help to Keep Teeth Clean
-  I Brush my Teeth Right After Every Meal
-  I Go to the Dentist Twice a Year
-  We Drink Milk and Eat Fruit
- A Tooth and Tooth Decay (chart)
- Toothbrush Right After Fork, Knife and Spoon

MENTAL HEALTH

- Adolescence
- Alcoholism
- Backward Child (The)
- Employment Opportunities in Mental Hospitals
- Epilepsy
- Helping Families in Trouble

- Leisure in the Later Years
- Mental Health
- Mental Health Clinics
- Mental Retardation
- Opportunities for Occupational Therapy Assistants in the Mental Health Field
- Opportunities for Registered Nurses in the Mental Health Field
- Opportunities for Social Workers in the Mental Health Field
- Planning for the Later Years
- Psychologists - Opportunities in the Mental Health Field
- Understanding the Young Adult

NUTRITION

- Canadian Average Weights (charts)
- Canada's Food Guide
- Food Guide for the Older Person
- Good Eating With Canada's Food Guide
- Good Red Blood
- Healthful Eating
- How To Plan Meals for Your Family
- Make Every Day Vitamin D Day
- Nutrient Value of Some Common Foods
- Score Sheet for Each Day's Meals
- The Noon Meal

Posters

- Breakfast As You Like It!
- Canada's Food Guide
- Eat Vegetables Every Day
- Figure Right with Canada's Food Guide
- "Growing" - Vitamin D Poster
- My Day's Food Adds Up to Canada's Food Guide
- Start Your Day With a Good Breakfast
- Time for a Good Noon Meal

(Nutrition publications and posters are distributed only from your provincial or local health department)

Special Committee

OCCUPATIONAL HEALTH

- Acids and Alkalis
- Guide for the Preparation of a Manual of Policies and Procedures
- Holiday Hazards
- Methyl Alcohol and Ethylene Glycol
- Resuscitation by Artificial Respiration (Bulletin)
- Phenol (Carbolic Acid) and Cresol

REHABILITATION SERVICES

- Deafness in Infants
- Opportunities for Occupational Therapists in Canada
- Opportunities for Physiotherapists in Canada
- Opportunities for Speech Therapists and Audiologists in Canada
- Rehabilitation in Canada (Reference "Canada's Health and Welfare", Vol. 22, No. 4, April, 1967)

BLINDNESS CONTROL

- Glaucoma
- Sharp Eyes for Teenagers

EMERGENCY HEALTH

- Family Health Planning for Disaster
- Your Basic List of First Aid Supplies
- * The following publications are for professional distribution only:
 - A.T.C. Operating Manual
 - Bibliography Relating to Disaster Nursing
 - Casualty from Nuclear Weapons Precis 6.22 Sections 1-7
 - Disaster Medical Care -- Collected Papers -- 1965
 - Emergency Care Chart for Registered Nursing Assistants
 - Emergency Field Sanitation
 - Emergency Hospital Operating Manual
 - Emergency War Surgery -- NATO Handbook -- Second Canadian Edition
 - Emergency Water Services and Environmental Sanitation
 - Environmental Health in Disaster
 - Hospital Disaster Planning

- Information Manual - Advanced Treatment Centre
- Information Manual - 50-Bed Hospital
- Information Manual - Blood Donor Pack
- Information Manual - Blood Shadow Depot
- Information Manual - Casualty Collecting Unit
- Information Manual - Emergency Hospital
- Information Manual - Health Supplies (complete)
- Information Manual Supplies - Hospital Disaster Supplies
- Management of Emergency Delivery
- Management of Human Behaviour in Disaster
- The Role of the Pharmacist in Emergencies

FOOD AND DRUGS

List of Current Publications

- A Candid Look At Cosmetics
- Consumer's Handbook (The)
- Don't Poison Your Family
- Drugs - Handle With Care
- Food Chemists
- Food, Drug, Cosmetic Protection for Canadians
- If It Is Not Food It Is Poison
- Keep Residues of Drugs & Pesticides Out of Milk
- Keep Your Home Free From Poisonings
- Label Story (The)
- Quackery
- What Does It Mean (Glossary of Drug Terms)
- Why Get Ill From Foods?

Tear Sheets

- Doubtful Treasure
- Is That Prescription Really Necessary
- Poison-Proof Your Home
- Self-Medication Road
- We Care About Consumers

"Drugs and You" Kit

An educational program on the careless handling and misuse of drugs. Contains a selection of FDD publications and 6 posters suitable for school and display purposes.

Special Committee

MEDICAL SERVICES

Indian and Northern Health Services

- Accidents - flip chart
- Boiling Water (Manual for filmstrip)
- Colds - flip chart
- Community Health Worker in Indian & Eskimo Communities (The)
- Community Health Worker Program - Analysis and Evaluation
- Diarrhoea - flip chart
- Eskimo Family Medical Pack - instruction booklet
- Good Food - Good Health - folder for Indians
- Good Food - Good Health - booklet for Eastern Arctic
- Good Food - Good Health - booklet for Western Arctic
- Guide to Treatment for Nurses and Lay Dispensers
- Have You a Safe Water Supply
- Housekeeping - Ways to Keep Your Home Clean and Safe
- How and What Do You Feed Your Flies - flip chart
- Introducing Your Community Health Worker
- Is Your Drinking Water Safe?
- Medical Questionnaire (English-Eskimo syllabics-French)
- Mother and Baby - booklet
- Pre-Natal Supplement - reminder card
- Report on Vital Statistics for Canadian Registered Indians
- A Sanitation Manual for Community Health Workers
- Some Ways to Prevent Sickness
- Tuberculosis Can Be Cured (Eskimo syllabics booklet)
- Tuberculosis Can Be Stopped (Indian booklet)
- Uses of Pamphlets and Posters
- Venereal Disease
- Venereal Disease (Eskimo syllabics)
- What Are You Doing? - flip chart
- What You Should Know About Rabies (English)
- What You Should Know About Rabies (English-Eskimo syllabics)
- When Baby Gets Big - leaflet
- When Baby is 2-6 Months Old
- When Baby is 6-12 Months Old

Posters

- Bedside Communication Chart (English-Eskimo syllabics-French)
- It's Clean Up Time - Eskimo
- It's Clean Up Time - Indian
- Poison Warning - (English-Eskimo syllabics)
- Recipe for a Clean Kitchen
- Sanitation Charts (series of 17)
- When Baby Gets Big

WELFARE

- Canada Pension Plan (The) (Booklet)
- Canada Pension Plan (The) (Folder)
- Guaranteed Income Supplement
- Old Age Security Pension
- Retirement Pensions (Booklet)

EMERGENCY WELFARE

- It's Your Life
- Personal Services
- Welfare Tips for Survival
- Your Emergency Pack

The following publications are available only to emergency welfare specialists and to those enrolled in training courses sponsored by the Emergency Welfare Services Division of the Department of National Health and Welfare.

- Emergency Clothing Manual
- Emergency Feeding Manual
- Emergency Lodging Manual
- Emergency Welfare Services Manual
- Personal Services Manual
- Prototype For a Municipal Emergency Welfare Services Program
- Registration and Inquiry Manual
- Survival Planning for Welfare Institutions

Special Committee

FITNESS AND AMATEUR SPORT

- *Family Camping*
 - *Figure Skating*
 - *Lacrosse*
 - *Ski* -- Fun for Everyone*
 - Fitness Publications Catalogue
 - Get Fit -- Keep Fit I
 - Get Fit -- Keep Fit II
 - Physical Education and Recreation in Europe
 - Points on Public Swimming Pools: their construction, maintenance and operation
 - Post-Graduate Scholarships and Fellowships in Fitness and Amateur Sport
 - Professional Opportunities in Physical Education and Recreation
 - Program for Everyone
 - *Track and Field Wall Charts
- | | | |
|---------------|---------------------|------------------|
| (1) Sprinting | (4) Middle Distance | (7) Relay Racing |
| (2) Shot-Put | Running | (8) Triple Jump |
| (3) Hurdling | (5) High Jump | (9) Javelin |
| | (6) Discus | |

+ These instructional manuals are part of "How to" Kits which include films and filmstrips in addition to the manuals.

The CAHPERS - Fitness Performance Test Manual (7 to 17 yrs)

The Physical Work Capacity of Canadian Children

13.2.3

CONFERENCES

1. Every unit of the department in the carrying out of its duties is involved throughout any given year in the planning, provision of speakers and other means of active participation in various professional and technical meetings, seminars and conferences, some of which have been described in the divisional descriptions of scientific activities. In this section we have focussed mainly in seven significant national conferences for which the department, in close cooperation with the agencies described therein, took major responsibility. The purpose, the date, the proceedings of these conferences are described below. The forthcoming first national seminar on the Planning and Construction of National Health Sciences Centres is also described.

2. We have also listed, a base year

(1) the federal-provincial conferences and meetings which serve to illustrate the range of issues annually deliberated and the extent of formal federal-provincial technical consultation and cooperation entailed in the carrying out of the normal responsibilities of the department pertaining to the health and welfare of Canadians and

(2) the Advisory Committees to the department.

13.2.3.1

CONFERENCE ON MENTAL RETARDATION

The first Federal-Provincial Conference on Mental Retardation, sponsored by the Minister of National Health and Welfare, the Honourable Judy LaMarsh, was held in Ottawa, Canada, October 19th - 22nd, 1964.

The Conference was conceived as a timely and essential step in seeking to improve, extend, and achieve greater coordination of health, welfare, educational, and vocational services for mentally retarded children and adults.

Some 160 delegates participated, representing federal and provincial health, welfare, education, vocational training, rehabilitation, and employment departments and services, as well as national voluntary organizations and professional groups

Special Committee

more or less directly concerned with mental retardation needs and problems. The Conference was thus limited with the idea that it should focus mainly on the operational problems and plans of government agencies responsible for the well-being of retarded and handicapped persons.

During the first three days delegates met in five plenary sessions, addressed to the following topics: prevention; detection, assessment and counselling; home care, treatment and continuing care; training, education, vocational preparation and employment; implementation, coordination and integration of services. Each session began with the presentation of formal papers and addresses by a panel of persons especially expert or experienced in the field under discussion; thereafter the session was open for general discussion and questions and answers between delegates and panel members. On the fourth day delegates broke up into ten discussion groups -- three concerned with education, three with vocational training and employment, two with health and two with welfare. The discussion groups concerned themselves with the immediate and practical problems of achieving greater effectiveness and coordination through existing services and of indicating as specifically as possible how these might need to be altered, modified, or extended to provide better services in the future.

13.2.3.1.1

Proceedings

1. Opening Remarks
2. First Plenary Session: "Prevention"
3. Second Plenary Session: "Detection, Assessment and Counselling"
4. Third Plenary Session: "Home Care, Treatment and Continuing Care"
5. Special Address: "The Potentialities of the Moderately and Severely Deficient"
6. Fourth Plenary Session: "Training, Education, Vocational Preparation and Employment"
7. Fifth Plenary Session: "Implementation, Coordination and Integration of Services"
8. Group Discussion: Health Aspects

9. Group Discussion: Educational Aspects
10. Group Discussion: Vocational Training and Employment Aspects
11. Group Discussion: Welfare Aspects
12. Concluding General Discussion
13. Conference Summation
14. Supplementary Reports of Individual Discussion Groups

For detailed proceedings of Conference see: Mental Retardation in Canada, Report Federal-Provincial Conference, Ottawa, Department of National Health and Welfare, October 1964.

13.2.3.2

NATIONAL CONFERENCE ON EPILEPSY

The Conference was held in the Board Room, Brooke Claxton Building, Tunney's Pasture, Ottawa, November 7-8, 1966.

The purpose of the meeting was threefold:

- a) to develop a current knowledge of the national picture relative to (i) the extent of the problem, (ii) current facilities and practices in the provision of services, (iii) opportunities for improvement, (iv) research needs;
- b) to stimulate interest in the subject on the part of all agencies involved;
- c) to facilitate the interchange of experience between the various local and provincial levels of action.

13.2.3.2.1

Agenda

I. Opening Remarks

Clinical Problems - definitions - diagnosis

--introduced by Dr. J. P. Robb

II. Descriptive Epidemiology

a) Canadian and international data - introduced by Dr. S. Acres

b) Disease Registries - introduced by Dr. R. S. Khazen

III. Existing facilities and services

a) Diagnosis, treatment and follow-up.

b) Institutional care.

c) Supportive programs - economic, educational, vocational.

IV. Research - basic and operational

Introduced by Dr. J. S. Prichard

V. Summary of main areas of weakness as seen by

- a) the clinician - Dr. A. A. Bailey
- b) the public health official - Dr. G. Allen
- c) the voluntary agency - Dr. K. Armstrong.

VI. a) Program suggestions - immediate and long-range - at all three levels, viz. local, provincial and federal.

- b) Evaluation of need for future conferences.

Detailed proceedings of Conference appear in "Summary Report on National Conferences on Epilepsy", Mimeo, 1966.

19.2.3.3

THIRD NATIONAL TUBERCULOSIS CONFERENCE-This was held under the joint auspices of the Department of National Health and Welfare and the Canadian Tuberculosis Association, at the Brooke Claxton Building, Ottawa, Ontario, on February 7 and 8, 1966. Invitations to attend the Conference were extended to the Provincial Directors of Tuberculosis Control to meet with representatives of the sponsoring groups for a discussion of common problems in the field of tuberculosis control with a view to making recommendations to the Dominion Council of Health, and to the Canadian Tuberculosis Association. Secretaries of voluntary provincial tuberculosis organizations were asked to sit in as observers. Fifteen specific recommendations for tuberculosis control were made.

1 .2.3.3.1

Proceedings

The Tuberculosis Problem - International and National

G.J. Wherrett, M.D., M.R.C.P. (Lond.), F.R.C.P. (C)

Highlights of the Tuberculosis Problem from the Provincial Point of View J.E. Hiltz, M.D., D.P.H.

Epidemiology of Tuberculosis. S. Grzybowski, M.D.

Notes on Planning, Evaluation and Indices in Tuberculosis Control H.N. Colburn, M.D.

The Prevention of Tuberculosis. N.E. McKinnon, M.B.

Statistical Problems in Tuberculosis Control. C.E. Baldwin, B.A.

The Tuberculosis Case Register - Review and Appraisal.

G.E. Maddison, M.D., D.P.H.

Tuberculosis Programs of the Medical Services, Department of National Health and Welfare. M. Matas, M.D.

Services of the Epidemiology Division Related to Tuberculosis

Control E.W.R. Best, M.D., D.P.H.

Current Status of National Health Grants. G.E. Wride, M.D.

The Program of the Canadian Tuberculosis Association

C.W.L. Jeanes, M.R.C.S., L.R.C.P., L.M.C.C.

Tuberculin Testing. G.D. Barnett, M.D.

The Study and Use of BCG in Canada Armand Frappier, M.D.,
and Marcel Cantin, M.D.

Standard Techniques and Methods of Tuberculin Testing and

BCG Vaccination Applicable to Public Health Programs

G.J. Wherrett, M.D., M.R.C.P. (Lond.), F.R.C.P. (C)

Mass X-Ray Surveys - Review and Appraisal. E.S. Peters, M.D.

Survey of High Risk Groups - Review and Appraisal.

H.H. Stephens, M.D.

Hospital Admission Chest X-Ray Program - Review and Appraisal

E.L. Ross, M.D.

Domiciliary Treatment of Tuberculosis. G.F. Kincade, M.D.

Chest Clinic Services in Rural Communities. E.M. Found, M.D., C.M.

Chemoprophylaxis. S. Grzybowski, M.D.

Establishment of a Tuberculosis Surveillance Research Study

C.W.L. Jeanes, M.R.C.S., L.R.C.P., L.M.C.C.

Developments in Research. L.B. Pett, PH.D., M.D.

For detailed proceedings of Conference, see Medical Services
Journal, Canada XXII: 10 November 1966.

13.2.3.4

CONFERENCE ON QUALITY ASSURANCE OF PHARMACEUTICAL PRODUCTS

The Conference was held in Ottawa, February 23 and 24, 1967.

The purpose of the Conference was to provide a forum for personnel
in the drug industry to meet with officers of the Food and
Drug Directorate, to exchange information about the findings
of the Directorate in both plant inspection and drug analyses,
and to discuss better means for more effective communications
between the Food and Drug Directorate and the pharmaceutical
industry on problems related to quality control.

Special Committee

13.2.3.4.1

ProceedingsFebruary 23, 1967Chairman, Morning Session -- L.I. Pugsley

Introductory Remarks. R.A. Chapman

The Food and Drugs Act and Quality Assurance of Pharmaceutical Products. M.G. Allmark

Pharmaceutical Product Development. L.M. Wheeler

Pharmaceutical Product Development from the Viewpoint of the Food and Drug Directorate. N.R. Stephenson

Discussion of Papers by L.M. Wheeler and N.R. Stephenson

Selection of Raw Materials. I.J. McGilveray

Quality Assurance of Raw Materials. J.W. Jenkins

Chairman, Afternoon Session -- F. Tilston

Quality Assurance During the Production Process. J.D. Tucker

The Production Process. Drug Plant Inspection by the Food and Drug Directorate. J.R. Smyth

Quality Assurance in Proprietary Medicines. C.L. Clarke

Quality Assurance in Proprietary Medicines. D.W. Hughes

Discussion of Papers by I.J. McGilveray, J.W. Jenkins, J.D. Tucker, J.R. Smyth, C.L. Clarke and D.W. Hughes

February 24, 1967Chairman, Morning Session -- J.A. Campbell

Stability of Drugs and Drug Products. Real Tardif

Stability of Drugs and Drug Products. W.N. French

Discussion of Papers by Real Tardif and W.N. French

Pharmaceutical Controls for Drug Availability. Denys Cook

Pharmaceutical Controls for Drug Availability. Ross F. Bethel

Discussion of Papers by Denys Cook and Ross F. Bethel

Chairman, Afternoon Session -- W.W. Wigle

Therapeutic Response in Oral Dosage Forms. A.B. Morrison

Therapeutic Response in Oral Dosage Forms. John Ruedy

General Conclusions. A.D. Grieve

Discussion of Papers by A.B. Morrison, John Ruedy and A.D. Grieve

Closing Statement. M.G. Allmark

A Pathologist's View-Point on Quality Assurance of Pharmaceutical Products. George Lumb

The Relation of Pharmaceutical Education to the Quality Assurance of Pharmaceutical Products. Roger Gaudry
Regulatory Agencies, Manufacturers and Scientists in Assurance of Quality Drugs. Takeru Higuchi
For detailed proceedings of Conference see - "Medical Services Journal Canada" XXIII: 3 March 1967.

13.2.3.5.

NATIONAL CONFERENCE ON MATERNAL AND CHILD HEALTH

The first Canadian Maternal and Child Health Conference was held in Ottawa, March 19-22, 1967.

A multidisciplinary conference planning committee, representative of health workers in the clinical, community and academic fields as well as social workers developed a program to examine the present health programs and services for mothers and young children (up to 2½ years) in the light of social changes which affect health needs, and which may require new approaches to the provision of services.

Participants included Provincial delegates from our Health, welfare and labour legislation fields, representatives from various national professional and voluntary associations and also internationally recognized authorities in the field of maternal and child health.

13.2.3.5.1

Proceedings

March 19, 1967

- Opening Remarks. Honourable Allan J. MacEachen, P.C., B.A., M.A.
Where Next? Leona Baumgartner, Ph.D., M.D.

March 20, 1967

- Maternal Care and Services
Chairman -- Dr. J.N. Crawford
Chairman's Remarks
- Prerequisites for Successful Childbearing. Sir Dugald Baird, M.D., D.P.H., F.R.C.O.G.
Symposium Chairman -- Dr. R.A.H. Kinch
- Clinical Aspects of High Risk Pregnancy. M. Gregory Tompkins, Jr., M.D., F.R.C.S. (C)
- Psychological and Sociological Aspects of Normal Pregnancy.
Howard J. Osofsky, M.D.

Special Committee

- The Unmarried Mother. Soeur Ste. Mechtilde, S.M., M.S.W.
- Educational Aspects of Prenatal Care. Mary Alice Gage, Reg. N., B.S.
- Continuity of Maternal Health Care. Lorne V. Jonat, M.D., M.P.H.
Chairman's Summary
- March 21, 1967
- Care and Services for Infants and Toddlers
Chairman -- Dr. J.E.F. Hastings
Chairman's Remarks
- Selected Aspects of Health Problems and Care of Young Children.
Helen M. Wallace, M.D., M.P.H.
- Symposium Chairman -- Dr. J.H. Read
Chairman's Remarks
- Clinical Aspects of Care of the Newborn. Sydney Segal, M.D.
- Parent Education: The Need for Continuity of Care. Helen M. Carpenter, Reg. N., M.P.H., Ed.D.
- Psychological Aspects of the Development of the Young Child.
C. Jules Lamarre, M.D.
- The Crisis Concept and Child Health Services. Helen H. Cave, M.S.W.
- Health Services for Toddlers and Pre-School Children.
Elizabeth N. McRae, M.D.
Chairman's Summary
Luncheon Chairman -- Dr. J.B. Bundock
- The Role and Training of Child Care Workers.
Mme le Docteur Nathalie P. Masse
- March 22, 1967
- Broader Horizons for Maternal and Child Health
Chairman -- Dr. J. Corbeil
- Mothers in the Labour Force -- Every Day Is the Hardest.
A. Betty Quiggin, M.Sc.
- Discussion
Panel Chairman -- Dr. Lise Fortier
Family Life Education. Harry H. Guest, M.A., M.Ed.
Family Planning. Marion G. Powell, M.D., D.P.H.
Genetics and Genetic Counselling. Margaret W. Thompson, Ph.D.
Discussion

Luncheon Chairman -- Mrs. Margaret Rideout

Chairman's Remarks

Conference Summation. Harry Medovy, M.D. F.R.C.P. (C)

Conference Chairman's Closing Remarks

— For detailed proceedings of Conference see Medical Services Journal Canada XXIII: 4 April 1967.

13.2.3.6

SYMPOSIUM - IMPROVEMENT OF HUMAN NUTRITION THROUGH RESEARCH

The Symposium on the improvement of human nutrition through research was held in Montreal, July 5, 1967, to review the contributions of research in agriculture, industry, home economics, and medicine to the improvement of nutrition.

13.2.3.6.1

Proceedings

Introductory Remarks. J.A. Campbell, Ph.D.

Contributions of Agricultural Research to Human Nutrition.

R.H. Common, Ph.D. (London), D.Sc. (London), D.Sc. (Belfast), F.R.S.C.

Contribution of Industrial Research to Human Nutrition.

Herbert P. Sarett, B.S., M.S., Ph.D.

Contribution of Home Economics Research to the Improvement of Human Nutrition. Janet M. Wardlaw, Ph.D.

The Contribution of Medical Research to Nutritional Science.

Richard B. Goldbloom, M.D., C.M., F.R.C.P. (C)

— For detailed proceedings of Symposium see, Medical Services Journal Canada, XXIII: 7, July-August 1967.

13.2.3.7

CONFERENCE ON MEDICAL MANPOWER

The Conference was held in the Brooke Claxton Building, December 13, 1967.

The purpose of this meeting was an attempt to reach an agreement on what studies and investigations must be undertaken to yield sufficient facts to make possible an effective appraisal of the situation of medical manpower in Canada.

To seek agreement on the scope of the studies program on the priorities of work and on the ways in which different agencies can share this work load.

Special CommitteeAgenda

1. Welcoming Address
2. Chairman's Opening Remarks
3. Health Resources Program
4. Health Manpower Studies Program
5. Discussion of Proposed Studies Framework
6. Manpower interests - Associations and Agencies
7. Chairman's Closing Remarks.

Participants attending the Conference.

Health Resources Fund and Medical Care Directorate, Hospital Services, Emergency Health Services Research and Statistics, Health Grants, representing our department. Department of Manpower and Immigration, Canadian Medical Association, Dominion Bureau of Statistics, Medical Council of Canada, Association of Canadian Medical Colleges, Canadian Hospital Association, College of General Practice, Canadian Public Health Association, Royal College of Physicians and Surgeons.

13.2.3.8

NATIONAL SEMINAR ON THE PLANNING AND CONSTRUCTION OF HEALTH SCIENCE CENTRES

Officers of the Health Insurance and Resources Branch are planning a National Seminar on the Planning and Construction of Health Science Centres to be held in the auditorium of the National Library on the 24th and 25th of October, 1968. The seminar is sponsored by the Minister of National Health and Welfare, with the assistance of provincial authorities represented by the Health Resources Advisory Committee, and under the joint auspices of the Health Facilities Design Division and the Health Resources Directorate. This seminar will be the first of its kind in Canada. It will be related to the new and expanding health science centres in Canada, such as are assisted by the federal and provincial programmes which contribute to the cost of planning and constructing health teaching and research facilities.

13.2.3.9 FEDERAL-PROVINCIAL MEETINGS

13.2.3.9.1 Federal-Provincial Nutrition Committee

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: --
- (c) Participation: Officials from all Provinces and of the Department of National Health and Welfare.
- (d) Periodicity of Meeting: Annually.

13.2.3.9.2 Director of Mental Health Services Meeting

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: --
- (c) Participation: Officials of all Provinces, except Newfoundland, and of the Department of National Health and Welfare.
- (d) Date: February 20, 21, 1968.
- (e) Periodicity of Meeting: Usually once a year.

13.2.3.9.3 Federal-Provincial Meeting of Nursing Officers

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To discuss nursing problems related to the Emergency Health Services programs and to make recommendations to the Federal-Provincial EHS Directors Conference.
- (c) Participation: Provincial EHS Nursing Consultant (4); Federal-Regional Nursing Officers; Directors of Public Health Nursing from those provinces having no EHS Nursing Consultant (6); Executive secretaries of the Provincial Nursing Association (10); Representatives from National Canadian Red Cross Society and the St. John Ambulance Association.
- (d) Date: October 3rd-4th, 1968.
- (e) Periodicity of Meeting: Annually.

13.2.3.9.4 Committee on Occurrence of Congenital Anomalies

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: --
- (c) Participation: Officials of all Provinces and of the Department of National Health and Welfare.

Special Committee

(d) Periodicity of Meeting: As required.

(e) Other Information: Nil.

13.2.3.9.5

Dominion Council of Health

(a) Nature of Meeting: Official level.

(b) Purpose of Meeting: --

(c) Participation: Officials of all the Provinces and of the Department of National Health and Welfare.

(d) Periodicity of Meeting: Twice yearly.

13.2.3.9.6

Federal-Provincial Conference of Ministers of Health

(a) Nature of Meeting: Ministerial Conference

(b) Purpose of Meeting: --

(c) Participation: Officials of all Provinces and the Minister of National Health and Welfare.

(d) Periodicity of Meeting: Ad hoc

13.2.3.9.7

Federal-Provincial Meeting of Emergency Health Services Directors

(a) Nature of Meeting: Official level.

(b) Purpose of Meeting: To discuss a proposed new method of financing the prepositioning of emergency medical units of the Emergency Health Service's Stockpile throughout the Provinces.

(c) Participation: Officials of all Provinces and of the Department of National Health and Welfare.

(d) Periodicity of Meeting: Ad hoc

(e) Other Information: Nil

13.2.3.9.8

Federal-Provincial Meeting of Emergency Health Services Supplies Officers

(a) Nature of Meeting: Official level.

(b) Purpose of Meeting: To review Federal and Provincial Health Supplies Programs, to introduce new Directives, Bulletins and Procedures and proposed changes in the Federal Health Supplies Program; and to make recommendations to the Federal-Provincial EHS Directors Conference.

(c) Participation: Health Supplies Officers from Federal and Provincial Emergency Health Services, observers from the Department of National Defence, National Pharmaceutical

Association, Health Mobilization Division, Department of Health Education and Welfare in U.S.A. and other government agencies and departments.

(d) Periodicity of Meeting: Annual

(e) Other Information: Nil.

13.2.3.9.9

Meeting of Deputy Ministers of Welfare

(a) Nature of Meeting: Official level - Deputy Minister of National Welfare and all provincial Deputy Ministers of Welfare.

(b) Purpose of Meeting: To discuss regulations and agreements under the Canada Assistance Plan and other Federal-Provincial measures.

(c) Participation: Federal and Provincial Departments of Welfare.

(d) Periodicity of Meeting: Ad hoc.

(e) Other Information: Nil

13.2.3.9.10

National Council of Welfare

(a) Nature of Meeting: Official level - Deputy Ministers of Welfare and ten non-governmental members.

(b) Purpose of Meeting: An advisory body to the Minister of National Health and Welfare which considers matters relating to income maintenance programs, welfare services, training of welfare personnel, welfare research and matters referred to in Section 5 of the National Health and Welfare Act related to the promotion or preservation of social security and social welfare of the people of Canada.

(c) Participation: Federal and all Provincial Departments of Welfare, non-governmental members (also observers from the Territories and from other Government Departments).

(d) Periodicity of Meeting: In future at least once and probably twice a year.

(e) Other Information: Nil.

Special Committee

13.2.3.9.11

Conference Between Canada Pension Plan Officers and Officers
of the Quebec Pension Board

- (a) Nature of Meeting: Meeting of Officials.
- (b) Purpose of Meetings: To discuss:
 - (i) the implementation of survivors' benefits effective January 1968.
 - (ii) the processing, approval and payment of retirement pensions.
 - (iii) the general administration of the Canada and Quebec Pension Plans.
 - (iv) the providing of information on the Plans to the public.
 - (v) other matters requiring concurrence to enable the two programs to operate along parallel lines.
- (c) Participation: Governments of Canada and Quebec.
- (d) Dates of Meetings: one or two day meetings in May, July, September, November 1967. (These meetings **were scheduled** but subject to possible change.)
- (e) Periodicity of Meetings: To date meetings have been on an ad hoc basis; beginning in May 1967, they **were** scheduled for every other month until the end of 1967.
- (f) Other Information: Nil.

13.2.3.9.12

Emergency Welfare Services Working Group on Registration and
Inquiry System for Natural Disasters

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To study and recommend a system for the registration of victims and the provision of information, to relatives in the event of a natural disaster.
- (c) Participation: Federal and Provincial welfare and private business officials.
- (d) Periodicity of Meeting: Ad hoc
- (e) Other Information: Nil

13.2.3.9.13

Emergency Welfare Services Working Group on Emergency Equipment

- (a) Nature of Meeting: Official level.

- (b) Purpose of Meeting: To study and recommend ways and means of producing and providing essential equipment and supplies for natural disasters in Canada.
- (c) Participation: Federal and Provincial welfare officials.
- (d) Periodicity of Meeting: Ad hoc.
- (e) Other Information: Nil.

13.2.3.9.14

Development of a National Emergency Welfare Plan

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To develop a national emergency welfare plan.
- (c) Participation: Deputy Minister of National Welfare and Deputy Ministers of Welfare of two provinces.
- (d) Periodicity of Meeting: Ad hoc.
- (e) Other Information: Nil.

13.2.3.9.15

Emergency Welfare Services - Annual Federal-Provincial Conference

- (a) Nature of Meeting: Interprovincial Conference (a two-day meeting).
- (b) Purpose of Meeting: To discuss and decide on Emergency Welfare Services Policy and Future Planning.
- (c) Participation: Senior officials of Welfare Departments.
- (d) Periodicity of Meeting: Once a year.
- (e) Other Information: Nil.

13.2.3.9.16

Emergency Welfare Services Working Group on Regional Emergency Government Headquarters

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To develop staffing, organization and procedures for REGHQ operations.
- (c) Participation: Emergency Welfare Services Directors.
- (d) Periodicity of Meeting: Ad hoc.
- (e) Other Information: Nil.

13.2.3.9.17

Emergency Welfare Services Working Group on Personal Services

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To recommend policy and procedures for Personal Services Program of the Emergency Welfare Services Division.

Special Committee

- (c) Participation: Federal and Provincial Officials, also private agencies.
- (d) Periodicity of Meetings: One per year.
- (e) Other Information: Nil.

13.2.3.9.18

Fitness and Amateur Sport Meeting in Conjunction With the First Canadian Winter Games

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To discuss and initiate a system of technical committees to develop long-range planning for all National Sports Governing Bodies and Recreation Agencies; for the purpose of considering the form to be followed in the evaluation reports of the first Canadian Winter Games.
- (c) Participation: All Provincial Directors of Fitness and Amateur Sport or their Designates, and senior members of the Fitness and Amateur Sport Directorate of the Department of National Health and Welfare.
- (d) Periodicity of Meeting: Ad hoc.
- (e) Other Information: Took place at the Chateau Frontenac, Quebec City. All Provincial Governments, the Territories and the Federal Government were represented.

13.2.3.9.19

Fitness and Amateur Sport Meeting in Conjunction With the Symposium on Recreation to be Held in Montreal

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: --
- (c) Participation: Provincial Directors of Fitness and Amateur Sport or their designates and senior members of the Fitness and Amateur Sport Directorate.

13.2.3.9.20

Fitness and Amateur Sport Meeting in Conjunction with the First Canadian Summer Games to be held in Dartmouth-Halifax August, 1969.

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To discuss plans and review progress of preparation for First Canadian Summer Games.

(c) Participation: Members of the Fitness and Amateur Sport Directorate and Provincial Fitness and Amateur Sport Officials.

(d) Periodicity of Meetings: Ad hoc.

(e) Other Information: From time to time throughout the year ad hoc meetings between members of the Directorate Staff and representatives of the Provinces will be held.

13.2.3.9.21

Ninth Federal-Provincial Conference on Fitness and Amateur Sport

(a) Nature of Meeting: Official level.

(b) Purpose of Meeting: In the main, to work out in more detail the mechanics for the submission of projects by the Province under the shared-cost agreements and to discuss other items of mutual interest to the Provincial and Federal Governments.

(c) Participation: Provincial Directors of Fitness Programs and officials of the Fitness and Amateur Sport Directorate.

(d) Periodicity of Meetings: Semi-Annual.

(e) Other Information: Nil.

13.2.3.9.22

Tenth Federal-Provincial Conference on Fitness and Amateur Sport

(a) Nature of Meeting: Official level.

(b) Purpose of Meeting: To discuss items of mutual interest to the Provincial and Federal Governments in the field of Amateur Sport.

(c) Participation: Provincial Directors of Fitness programs and offices of the Fitness and Amateur Sport Directorate.

(d) Periodicity of Meeting: Semi-Annual.

(e) Other Information: Nil.

13.2.3.9.23

Fitness and Amateur Sport Meeting in Conjunction with the Pan American Games in Winnipeg

(a) Nature of Meeting: Official level.

(b) Purpose of Meeting: --

(c) Participation: Members of the Fitness and Amateur Sport Directorate and Provincial Fitness and Amateur Sport Officials.

Special Committee

- (d) Periodicity of Meeting: Ad hoc.
- (e) Other Information: From time to time throughout the year ad hoc meetings between members of the Directorate Staff and representatives of the Provinces will be held.

13.2.3.9.24

Eighth Federal-Provincial Conference on Fitness and AmateurSport

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: In the main, to work out in more detail the mechanics for the submission of projects by the Provinces under the shared-cost agreements and to discuss other items of mutual interest to the Provincial and Federal Governments.
- (c) Participation: Provincial Directors of Fitness Programs and officials of the Fitness and Amateur Sport Directorate.
- (d) Periodicity of Meeting: Semi-annual.
- (e) Other Information: Nil.

13.2.3.9.25

Ninth Federal Provincial Conference on Fitness and Amateur Sport

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To discuss items of mutual interest to the Provincial and Federal Governments in the field of Amateur Sport.
- (c) Participation: Provincial Directors of Fitness programs and offices of the Fitness and Amateur Sport Directorate.
- (d) Periodicity of Meeting: Semi-annual.
- (e) Other Information: Nil.

13.2.3.10

ADVISORY MEETINGS

13.2.3.10.1

Advisory Committee on Epidemiology

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: --
- (c) Participation: Officials of the Department of National Health and Welfare and of all Provinces.
- (d) Periodicity of Meeting: Usually one a year.
- (e) Other Information: Nil.

Advisory Committee on Maternal and Child Health

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: --
- (c) Participation: Officials of all Provinces and of the Department of National Health and Welfare.
- (d) Date: March 22 and probably in the Fall.
- (e) Periodicity of Meeting: Annually.
- (f) Other Information: Nil.

13.2.3.10.2

Advisory Committee on Dental Health

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To advise the Minister of National Health and Welfare on all matters pertaining to dental and oral health.
- (c) Participation: Officials from all Provinces and of the Department of National Health and Welfare plus other selected experts.
- (d) Periodicity of Meeting: Annually.
- (e) Other Information: Nil.

13.2.3.10.3

Advisory Committee on Mental Health

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: --
- (c) Participation: Officials of all Provinces and of the Department of National Health and Welfare.
- (d) Periodicity of Meeting: Usually once a year.
- (e) Other Information: Nil.

13.2.3.10.4

Committee on Occurrence of Congenital Anomalies

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: --
- (c) Participation: Officials of all Provinces and of the Department of National Health and Welfare.
- (d) Periodicity of Meeting: As required.
- (e) Other Information: Nil.

Special Committee

13.2.3.10.5

Advisory Committee on Immunizing Agents

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: --
- (c) Participation: Officials of all Provinces and of the Department of National Health and Welfare.
- (d) Periodicity of Meeting: As required.
- (e) Other Information: Nil.

13.2.3.10.6

Advisory Committee on Public Health Engineering

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: --
- (c) Participation: Officials of all Provinces and of the Department of National Health and Welfare.
- (d) Date: Late October (not firm)
- (e) Periodicity of Meeting: Twice annually.
- (f) Other Information: Nil.

13.2.3.10.7

Advisory Committee on Radiation Protection

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To provide the Minister with assistance and advice in the continuing development of a comprehensive national radiation protection program, and to study and make recommendations concerning radiation protection standards for Canada.
- (c) Participation: Officials from all Provinces and of the Department of National Health and Welfare plus other selected experts.
- (d) Periodicity of Meetings: Approximately once a year.
- (e) Other Information: Committee formed in 1963.

13.2.3.10.8

Advisory Committee on Clinical Uses of Radioisotopes

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To advise the Minister on all matters pertaining to the clinical uses of radioactive materials in Canada, with particular reference to licensing assessments made under the Atomic Energy Control Regulations.

(c) Participation: Officials from all Provinces and of the Department of National Health and Welfare plus other selected experts.

(d) Periodicity of Meetings: Approximately once a year.

(e) Other Information: Committee formed in 1955.

13.2.3.10.9

Advisory Committee on X-Ray Safety Standards

(a) Nature of Meeting: Official level.

(b) Purpose of Meeting: To study and make recommendations on the action that should be taken by governmental regulatory agencies for the safety of x-ray installations and operations.

(c) Participation: Partly Provincial and Partly other experts.

(d) Periodicity of Meetings: Not specified, depending upon staff work required in the preparation of documents for review.

(e) Other Information: Committee formed in 1963.

13.2.3.10.10

Advisory Committee on Non-Clinical Uses of Radioisotopes

(a) Nature of Meeting: This committee not yet formed - it has been proposed and may be established this year-official level.

(b) Purpose of Meeting: To develop Federal-Provincial policy respecting health and safety supervision related to the non-clinical uses of radioisotopes.

(c) Participation: Federal-Provincial Health Department officers.

(d) Periodicity of Meetings: Probably annually.

(e) Other Information: Nil.

13.2.3.10.11

Health Resources Advisory Committee

(a) Nature of Meeting: Official level.

(b) Purpose of Meeting: To examine five year program and advise Minister of National Health and Welfare of expenditures from the Health Resources Fund and other related matters.

Special Committee

(c) Participation: Officials of all Provinces and of the Department of National Health and Welfare.

(d) Periodicity of Meeting: Annually.

(e) Other Information: Nil.

13.2.3.10.12

Advisory Committee on Hospital Insurance and Diagnostic Services

(a) Nature of Meeting: Official level.

(b) Purpose of Meeting: To discuss matters of policy, procedure and development related to the national program.

(c) Participation: Officials of the Provinces and the Federal Government.

(d) Periodicity of Meetings: Usually twice a year.

(e) Other Information: Nil.

13.2.3.10.13

Finance and Accounting Subcommittee of the Advisory Committee on Hospital Insurance and Diagnostic Services

(a) Nature of Meeting: Official level.

(b) Purpose of Meeting: To discuss technical matters related to the financing and accounting of the program.

(c) Participation: Provincial (all Provinces) and Federal Officials.

(d) Periodicity of Meeting: Ad hoc.

(e) Other Information: Nil.

13.2.3.10.14

Residency and Uniformity of Benefits Subcommittee of the Advisory Committee on Hospital Insurance and Diagnostic Services

(a) Nature of Meeting: Official level.

(b) Purpose of Meeting: To discuss problems related to eligibility coverage under the program.

(c) Participation: Provincial (all Provinces) and Federal Officials.

(d) Periodicity of Meeting: Ad hoc.

(e) Other Information: Nil.

13.2.3.10.15

Working Party on Morbidity Statistics of the Advisory Committee on Hospital Insurance and Diagnostic Services

(a) Nature of Meeting: Official level.

(b) Purpose of Meeting: To reorganize hospital morbidity reporting for the 8th Revision of the International

Classification of Diseases and the introduction of Medicare in Canada.

- (c) Participation: 16 experts from Provincial Governments and Federal agencies concerned.
- (d) Periodicity of Meetings: Ad hoc.
- (e) Other Information: Reporting to Subcommittee Meeting 27 and 28 March.

13.2.3.10.16

Working Party on Standardized Hospital Terminology of the Advisory Committee on Hospital Insurance and Diagnostic Services

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To standardize terminology with respect to hospital facilities, services, training and personnel.
- (c) Participation: 13 experts from Provincial voluntary and Federal agencies concerned.
- (d) Periodicity of Meetings: Ad hoc.
- (e) Other Information: Reporting to Subcommittee Meeting March 27 - 28, 1968.

13.2.3.10.17

Subcommittee on Statistics and Quality of Care of the Advisory Committee on Hospital Insurance and Diagnostic Services

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To review recommendations and reports of working parties and to prepare a report for the Advisory Committee on Hospital Insurance and Diagnostic Services.
- (c) Participation: Representatives from each Provincial Hospital Insurance Plan.
- (d) Periodicity of Meetings: Ad hoc.
- (e) Other Information: To make final recommendations to the Advisory Committee on Hospital Insurance and Diagnostic Services.

Special Committee

13.2.3.11

INTERNATIONAL HEALTH

13.2.3.11.1

National Advisory Committee on International Health

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To advise and assist in respect of policy, procedure and development of Canada's international health program.
- (c) Participation: Designated representatives of: Canadian Medical Association, L'Association des Médecins de Langue Française du Canada, Royal College Of Physicians and Surgeons of Canada, Association of Canada Medical Colleges, Canadian Nurses' Association, Canadian Dental Association and other selected experts.
- (d) Periodicity of Meeting: Annually (usually).
- (e) Other Information: The Committee consists of 6 "permanent" representatives and as many as 6 others appointed for the purpose of any one meeting by the Minister.

13.2.3.12

RESEARCH AND STATISTICS

13.2.3.12.1

Research and Statistics Sub-Committee on Quality of Care

- (a) Nature of Meeting: Official level.
- (b) Purpose of Meeting: To review technical problems in hospital insurance.
- (c) Participation: Representatives of the Federal Government and all Provinces as well as the Yukon and Northwest Territories.
- (d) Periodicity of Meeting:
- (e) Other Information: Nil.

13.2.3.13

EMERGENCY WELFARE

13.2.3.13.1

Emergency Welfare Services Advisory Committee

- (a) Nature of Meeting: Interprovincial meeting (a two-day meeting)
- (b) Purpose of Meeting: Define goals for the development of Emergency Welfare Services and to define projects to be undertaken.
- (c) Participation: Provincial officials.
- (d) Periodicity of Meeting: Ad hoc.
- (e) Other Information: Nil.

13.2.4	<u>Projects</u>	
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13.2.4.1.1

HEALTH SERVICES BRANCH

Environmental HealthOccupational Health DivisionBiomedical Unit

- Title: Study of Health Effects of Large Scale Aerial Application of Pesticides

Objectives and Findings:

Health surveillance programme developed in connection with spraying of forests in New Brunswick. Improvement in environment and medical control measurements affected as well as improvements in packaging and disposal. Clinical Studies (including cholinesterase determinations) continued during spraying programme this year.

Developed in collaboration with Department of Northern Affairs and the Canadian Wildlife Service. Continuing surveillance of exposed workers upon request of New Brunswick Department of Health.

- Title: Study is being planned to derive absolute rates of death and morbidity in long-term follow-up studies of workers in industry.

Objectives and Findings:

The methods to be used will involve rates decrement the methods for which, in regard to sickness, are now being examined

Utilization of such methods are relatively new

in Canada and hold much promise for firm contributions in the occupational health field. The application of "operational research" methods in the area of occupational health has major importance for (a) "the evaluation of health services and programmes", and (b) to investigate "the etiology and epidemiology of diseases (due to radiation, air pollution, carcinogenic substances) in longitudinal studies" which are of recognized importance.

- Title: Frequency of Death, by selected causes.

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Objectives and Findings:

To ascertain the frequency of death by selected causes, for defined groups of people living at various places in Canada at different periods; to relate such frequencies to environmental factors such as population density, degree of air pollution, etc.

Routine vital statistics and administrative records if properly developed can be made more useful for health indicator purposes. We also need the best available measures of incidence and prevalence of diseases influenced by occupational and other hazards. It is anticipated that the proposed study will provide useful information in this regard and somewhat similar to that contained in the extensive report of Manos (1957) "Comparative Mortality among Metropolitan Areas of the United States, 1949-51, 102 Causes of Death".

- Title: Development of a model for evaluating the sickness experiences of groups of workers in industry.

Objectives and Findings:

The scheme is generally in the area of replacement processes in the operational research field.

Study is being planned. Improved "health indicators must be devised and produced" (50) for assessing sickness experiences. It is believed that exposed-to-risk formulae, when developed and used in multiple decrement studies, will be superior to those now employed.

- Title: To assess the importance as a health hazard of high concentrations of arsenic in an environment. (Initiated by Medical Services Directorate).

Objectives and Findings:

Earlier surveys by the Occupational Health Division have shown that arsenic is present in the air, on ground and in water at Yellowknife above normal amounts. Evidence in the literature suggests that arsenic might be an important factor in the causation of cancer. It is thus proposed to carry out a health survey at Yellowknife to ascertain the possible deleterious effects of arsenic in the environment.

Title: Study of Lung Cancer Among Fluorspar Miners, St. Lawrence Newfoundland.

Objectives and Findings:

To reveal causes of lung cancer in a group of Newfoundland miners exposed to radiation.

Obtained presumptive evidence that radiation might well be a cause of lung cancer under certain conditions (see Brit. J. Ind. Med., 21, 94, 110, 164). On the basis of this information, the concentration of radiation to which miners were exposed was reduced to levels believed to be innocuous.

Further field and laboratory studies are needed to uncover the importance that age, radiation dosage levels and other factors might have in the etiology of lung cancer.

Environmental Assessment Unit

Title: Establishment of Specifications for Compressed Air

Date: Began; 1961, Continuing

Objectives and Findings: Committee project involving both CSA and ASA

The second draft specification was prepared and submitted to ASA, New York City in January 1966. To date it has not been distributed, the excuse advanced being that ASA do not have a sponsor for this particular committee.

The first draft specification for CSA has been prepared and distributed. The second draft is now being prepared for distribution and approval by letter ballot.

Specific Objective: For procurement purposes, there is a need for specifications for compressed air.

Title: Editorial Referee Activity for IUPAC, AIHA and Inter-society Committee.

Date: Began, 1955, Continuing

Objectives and Findings:

Analytical methods are abstracted, approved and published for the American Industrial Hygiene Association. First edition of AIHA Analytical Abstracts published May, 1965.

Analytical methods prepared for IUPAC in 1967 are as follows:

Iron

Antimony

Fluoride

Cadmium

Analytic Methods in preparation for Intersociety Committee on Antimony and polycyclic hydrocarbons.

Specific Objective: These method compilations are useful guides to world health organizations encountering a particular problem for the first time.

— Title: International Registry of Polycyclic Hydrocarbons

Date: Began, 1955, Continuing

Objectives and Findings:

Polycyclic hydrocarbons are collected and catalogued by purchase, gift and loan. Synthesis and purification of improved grades is in progress. A zone melting apparatus has been constructed, and a preparative gas chromatograph is being installed in a fume hood.

Papers: 'Standardisation in the Analysis of P.A.H.' J. Air Poll. 9, 833, 1966.

Polycyclic Hydrocarbon Stock List, August, 1967.

Specific Objective: In all analytical chemistry but particularly in polycyclic hydrocarbon analysis and carcinogenicity studies pure reference compounds are essential.

— Title: Gas Chromatographic Separations.

Date: Began, 1955, Continuing

Objectives and Findings:

A fundamental study of gas chromatography has been made with particular reference to separations possible and methods of deciding whether a peak is unique or not. Column materials, group chemical tests, preliminary separations, differential separations and detectors have all been investigated. Two and three component mixtures containing alcohol have been analysed by G.C. and it is evident that alcohol cannot always be identified positively.

Several anomalies have appeared which require careful investigation. BaP and BeP appear as one peak. BkF appears as a separate peak distinct from BaP/BeP peak. However, results by other methods do not agree with analysis based on BkF peak. The probability is that the BkF peak is also not unique.

Paper: "Chromatographie en Phase Gazueuse", Bulletin, Can. Soc. Forensic Sciences, June, 1967.

Specific Objective: The fact that G.C. identifications are not absolutely certain, requires that additional tests be carried out in series and parallel.

— Title: Ultraviolet Analysis of Polycyclic Hydrocarbons

Date: Began, 1955, Continuing

Objectives and Findings:

An exhaustive study of the ultraviolet spectroscopy of polycyclic hydrocarbons is in progress.

Paper: "Flourescence spectroscopy in the analysis of air samples" Abstracts 151st ACS Meeting, Pittsburgh, March, 1966.

"Measurement of Benzo [a] pyrene, Benzo [k] fluoranthene and Benzo [g,h,i] perylene by ultraviolet spectroscopy", In press, Mikrochem Acta, November, 1966.

"Column Chromatography and Spectroscopy in the analysis of Airborne Polycyclics", J. Chromatog. 28, 317, 1966.

"The Background in Ultraviolet Spectroscopy", In press, J.A.I.H.A.

Specific Objective: Part of the general investigation of polycyclic hydrocarbons in polluted air.

— Title: Improvements in Instrumentation for Air Sampling.

Date: Began, 1960, Continuing.

Special Committee

Objectives and Findings:

During 1964 a millipore tape sampler was redesigned. In 1965 a 12 position filter paper sequential sampler was designed and built. The Gelman air sampling valve was redesigned to be used as an automatic air sampling system.

With the recent acquisition of a specific ion fluoride electrode it is hoped to be able to develop a continuous fluoride detector.

Papers: "The Design of Air Sampling Devices", in Analysis

Instrumentation, 1965.

"Instrumentation for Air Pollution Monitoring". Presented at AID Symposium Instrument Society of America, Houston, May, 1966.

"A devise for the rapid evaluation of Recorder Strip Charts", Mikrochem Acta. 3, 465, 1967.

Specific Objective: Better air sampling devices and techniques are badly needed.

— Title: Analytical Referee Activity for AOAC and ACGIH.

Date: Began, 1961, Continuing

Objectives and Findings:

Since 1961 methods for fluoride, iron, antimony, mercaptane, benzene and toluene have been referred.

The chairman (J.L.M.) of the Recommended Analytical Methods Committee ACGIH has resigned April 1967, but several analytical assignments are expected from the new chairman.

A collaborative survey on atomic absorption is to be carried out in 1967 for AOAC.

Specific Objective: There is a continuing need for reliable analytical methods for materials of occupational health interest. The reliability is assessed by actual testing.

— Title: Fluorescence analysis of polycyclic hydrocarbons.

Date: Began, 1961, Continuing

Objectives and Findings:

A fundamental study of fluorescence is being made. The accumulation and tabulation of the excitation and emission spectra of

the pure reference compounds is proceeding steadily. The effect of concentration quenching and other interferences is under investigation. Six papers published 1962 - 1965.

Paper: Some Improvements in the Determination of Benzo a pyrene in Air Samples. In press. J. APCA, August, 1967.

Specific Objective: Part of the general investigation of polycyclic hydrocarbons in polluted air.

— Title: Possible oil absorption on cylinder walls.

Date: Began, 1962, Continuing.

Objectives and Findings:

This is part of the problem of the alleged oil content of compressed air. 6 Scuba cylinders have been extracted with spectro grade cyclohexane and some unknown organic compounds have been observed which are undergoing identification.

Specific Objective: Work undertaken on behalf of D.N.D. to develop analytical methods and to prepare specifications for oil pumped compressed air.

— Title: The sulphur content of Urban air

Date: Began, 1965, Continuing.

Objectives and Findings:

The same detector used for carbon monoxide can also be used for gaseous sulphur compounds. The location of the new laboratory is a particularly good one to observe the mercaptan inversion concentrations from Hull.

Due to lack of funds, a continuous recording sulphur analyzer could not be obtained. With the recent acquisition of a specific ion electrode, it is hoped to be able to construct a continuous detector for hydrogen sulphide and mercaptans.

Specific Objective: Continuous monitoring of mercaptans is particularly appropriate in the neighbourhood of paper mill sources.

— Title: Separation of Polycyclic Hydrocarbons by Column Chromatography.

Date: Began, 1965, Continuing

Objectives and Findings:

A study is being made of optimum column activity, moisture content of adsorbent and solvents, conditions for optimum separation, per cent recovery from column etc.

Papers: "New Techniques in Polycyclic Hydrocarbon Analysis", Buenos Aires, November, 1965.

"The Routine Determination of Polycyclic Hydrocarbons in Airborne Pollutants". In press, J. Chromatog. 26, 456, 1967.

Comparison of Three Methods for Trace Analysis of Polycyclics" In press. Mikrochem Acta. December, 1966.

Specific Objective: The elucidation of the column chromatographic process, as part of the problem of polycyclic hydrocarbon analysis.

— Title: Blank values of filtering media.

Date: Began, 1966, Continuing.

Objectives and Findings:

The literature contains only superficial data on the heavy metal and other blank values in filtering media such as glass fibre sheet. It is believed that the trace metal concentrations in air samples published by the National Air Sampling Network of the USPHS are inaccurate due to their failure to recognise the high and variable blank contamination of their filter media. Some unexpected results on the recent testing of three filter varieties indicate the lead blank to be satisfactory, the magnesium blanks to be very high, and one filter also to be very high in zinc. These filters, accordingly, would not be suitable for sampling chrysotile asbestos in air.

Further work has been carried out in 1967 on a large selection of filter media both organic and inorganic. Organic filters, in

general, are much cleaner, and the elimination of glass fibre as an air sampling medium may have to be considered.

Specific Objective: It is fundamental that the filter medium be free of the material being sampled. To our knowledge, only one large scale survey has been carried out on a purified filter medium, that of this laboratory in 1956.

— Title: Combustion Research.

Date: Began, 1967, Continuing.

Objectives and Findings:

The pilot combustion process in operation at 40 Lydia Street is being investigated by both groups. So far levels of vanadium, magnesium, iron and sulphate have been determined. In addition, volatile, combustible and ash content of the "oil ash" has been determined. An unexpected finding was that the polycyclic and volatile hydrocarbon content of the flue and stock gases was negligible.

Specific Objective: This survey will lead to knowledge of best operating conditions to avoid air pollution externally and corrosion internally.

— Title: Survey Air Pollution, Tunney's Pasture.

Date: Began, 1967, Continuing

Objectives and Findings:

Several problems in this vicinity are the possible trans-river movement of sulfur compounds and cement dust from Quebec to Ottawa and the local pollution of the Tunney's Pasture area, by laboratory incinerators and the central heating plant. Dust loadings, sulphate, lead, calcium and polycyclics are being measured.

A preliminary communication on sulphate in air concentrations was presented to an International Symposium, OCDE in June at Mainz, Germany.

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Specific Objective: Among other things, this survey should establish whether the area surveyed is actually clean or not. The results should be of use as a contemporaneous comparison with the Windsor survey.

— Title: Analytical Intergrout Comparison Lead in Air

Date: Began, 1967, Continuing

Objectives and Findings:

Lead in air measurements are now done on Hi-Vol aliquot discs analysed by polarography or atomic absorption. Preliminary work has indicated that concordant results may be possible comparing polarography and X-ray fluorescence. At present, aliquot discs are being analysed by X-ray fluorescence. All discs after X-ray analysis are to be analysed by atomic absorption.

Specific Objective: If X-ray fluorescence can be used in this instance it will help to even out the analytical load.

Enzyme Chemistry Section

— Title: Studies in Enzyme Reactivation

Date: Began, 1964. Partly 1967, Partly continuing.

Objectives and Findings:

Research publication produced and seminar given.

Specific Objective: Toward a better understanding of the mechanism of reactivation of enzymes which have been inhibited by chemical toxicants.

— Title: Miscellaneous Studies on Esterases

Date: Began, 1964, Continuing

Objectives and Findings:

Decline and recovery of enzyme activity after dosing with pesticide has been observed. Changes occurring with both have also been noted and changes in stored blood and serum at various temperatures investigated.

Specific Objective: Towards a better understanding of factors which influence enzymic activities especially as they are measured in routine surveys.

— Title: Studies on Chlorinated Hydrocarbons

Date: Began, 1966, Continuing

Objectives and Findings:

Project in initial stages. Literature review no experimental work likely in 1967.

— Title: Enzyme Purification by Electrophoresis and Related Techniques.

Date: Began, 1966, Continuing

Objectives and Findings:

Enzyme isolation techniques are being developed.

Specific Objective: It contributes to other projects in this section and will also contribute an important facility for future projects.

— Title: Medium Effects on Ionization of Cholinesterase

Date: Began, 1966 - Spring, 1967.

Objectives and Findings:

The activity of enzymes has been demonstrated to depend in part upon the medium in which the activity occurs.

Specific Objective: To further the knowledge of the active site of the enzyme concerned.

— Title: Toxicity Studies with Mixed Toxicants

Date: Began, 1967, Continuing

Objectives and Findings:

The enhanced toxicity occasioned by simultaneous administration of two organo phosphates has been demonstrated.

— Title: A study of the In Vivo Conversion of organic thiophosphates to Phosphates and its relation to the mode of action of chlorinated hydrocarbons.

Objectives and Findings:

Experimental work has been carried out on the conversion of thiophosphate to phosphate and the inhibition of the conversion by the chlorinated hydrocarbons.

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— Title: Factors Influencing Mammalian A-esterase Activities.

Objectives and Findings:

The inhibition of rate serum A-esterases by several metals have been investigated and is continuing.

Physics Section

— Title: Fundamental and applies research on the interaction of X-rays with substances analysed by means of our X-ray analytical instrumentation.

Date: Began, 1950, Continuing

Objectives and Findings: Two papers of this fundamental nature are: Fluorescence yield of a given element as a function of the spectral distribution of the exciting primary beam. Can. Spectroscopy, November 1967.

Improvement of X-ray spectrographic analysis by filtration of the L lines from the primary beam. Can. Spectroscopy, January 1968.

Specific Objective: To further give us the theoretical knowledge essential to make the best use of our instrumentation.

— Title: Comparison of fiber glass and cellulosique membrane as substrates for supporting air pollution samples.

Date: Began, 1965 - 1968.

Objectives and Findings:

Actual findings demonstrate already that the fiber glass filters are definitely inferior in terms of chemical purity and useless in terms of direct sizing of the particles deposited in microgram quantities for air pollution studies.

Specific Objective: To permit quick and accurate analysis of elements such as sulphur, arsenic, lead, etc. in urban air pollution.

— Title: Development of a technique for the analysis of ultra thin air pollution samples by X-ray spectrography.

Date: Began, 1965 - 1968.

Objectives and Findings: The technique has been already applied for analysing lead only in a New Brunswick battery plant.

It has been proved since to be applicable to industrial and urban atmospheres for analysing sulphur, arsenic, lead, bromine, mercury etc. in microgram quantities.

Specific Objective: Air pollution problems.

- Title: Use of freeze-drying technique for preparing particulate suspensions free of agglomerates for dust separation by size and size counting.

Date: Began, 1967, Continuing.

Objectives and Findings:

Standardisation of this technique is in progress. When this is finalised, we expect that elutriation of particulate material and its size measurement by optical and electron microscopy will be less time consuming and more accurate.

Specific Objective: X-ray diffraction analysis of dust in the respirable size and microscopy studies.

- Title: Use of freeze-drying techniques for the analysis of tissues, such as blood, lung, liver etc., for X-ray diffraction and fluorescence analysis.

Date: Began, 1967 - 1968.

Objectives and Findings:

Freeze-drying technique will be an invaluable aid here in the analysis of quartz by X-ray diffraction and elements in tissues which will not be destroyed by heat and will be ready to be pressed in pellets for X-ray fluorescence.

Specific Objective: Will serve in the analysis of toxic material such as sulphur, arsenic, lead, zirconium, etc., in urine, blood and human tissues by X-ray fluorescence whenever it is requested.

- Title: Technique for the analysis of toxic elements such as arsenic in human hair by X-ray fluorescence.

Date: Began, 1967 - 1968.

Objectives and Findings:

A method of hair pulverisation is actually developed in order to mix it homogeneously with cellulose powder. Mixture being pressed into a solid pellet will be analysed for its arsenic content by X-ray fluorescence.

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Specific Objective: This technique will offer an elegant mean to evaluate arsenic and other elements whenever this toxicological problem requires it.

— Title: Quartz (free silica) size analysis of several commercial and domestic cleansers.

Date: Began, 1967 - 1968,

Objectives and Findings:

Several wellknown brands of cleansers have already been separated in the minus 5 micron size and have been proved to be a great health hazard for manipulators due to the presence of a large quantity of free silica - results to be published in 1968.

Specific Objective: Attention of provincial agencies will be directed towards this problem.

Occupational Health Division

— Title: Metabolic Transformations of Toxic Organic Compounds.

Date: Began, 1956, Continuing.

Objectives and Findings:

Paper to be presented at an International Symposium in Prague this year.

Specific Objective: To determine the health effects resulting from exposure to specific organic compounds and to develop diagnostic techniques.

— Title: Placental Transfer of Toxic Compounds.

Date: Began, 1956, Continuing.

Objectives and Findings:

Fate of trichlorethylene metabolites in membrane continuing.

Specific Objective: To predict the damage which may result from industrial exposure of pregnant mothers to toxic substances.

— Title: Chemical Carcinogenesis.

Date: Began, 1958, Continuing project.

Objectives and Findings:

Chemical bladder carcinogens have been discovered. Metabolites have been synthesized which are also carcinogenic.

Specific Objective: To determine the carcinogenic activity of specific industrial chemicals.

— Title: Mechanisms of Action and Pulmonary Retention of Toxic Gases and Vapours.

Date: Began, 1961, Continuing.

Specific Objective: To determine toxic effect resulting from low-level exposure to gases encountered in air and industrial atmospheres.

— Title: Experimental Determination of Threshold Limit Values (TLV) of Toxic Substances.

Date: Began, 1962, Continuing.

Objectives and Findings:

Determination of glucuronic acid in urine demonstrated as a reliable method of assessing exposure. Paper to be published in Journal of American Industrial Hygiene Association.

Specific Objective: To determine threshold limit values of a series of chemicals used in industry.

— Title: Mechanism of Induction of Bladder Carcinoma by Ortho-Methoxyl Derivatives of Aromatic Amines.

Date: Began, 1962, Continuing.

Objectives and Findings:

Synthesis of a variety of metabolic derivatives has been accomplished.

Specific Objective: To determine the mechanism of induction of bladder carcinoma resulting from exposure to specific industrial chemicals.

— Title: Critical Evaluation of Testing Methods for Carcinogenic Activity (skin, lung, bladder, etc.).

Date: Began, 1962, Continuing.

Objectives and Findings:

Routes of administration of carcinogens have been examined and effect on tumor development of various techniques investigated.

Specific Objective: To suggest the most appropriate method of testing environmental carcinogens.

- Title: Development of a Training Programme in Environmental Toxicology.
- Date: Began, July 1, 1966, Continuing.
- Objectives and Findings:
- Development of Toxicology Programme in collaboration with University of Ottawa in progress.
- Specific Objective: This project contributes to the training of toxicologists.
- Title: Structure and Biological Activity of Environmental Toxicants.
- Date: Began, 1966, Continuing.
- Objectives and Findings:
- Limited prediction of Biological activity of certain compounds in the bases of chemical structure.
- Specific Objective: To predict the biological activity of environmental toxicants.
- Title: Biochemical Pathology of the Lung in Relation to Environmental Factors.
- Date: Began, new, Continuing.
- Objectives and Findings:
- Project being developed.
- Specific Objective:
- To study the mechanism(s) of action of various environmental factors on the lung.
- Title: Standardization and Development of Biochemical and Toxicological Research Techniques to Assess the Toxicity of Industrial Compounds.
- Objectives and Findings:
- Event sorter developed and discreet changes in activity due to low concentrations of industrial solvents detected. Paper presented and published, multichannel telemetering system developed.
- Specific Objective: To improve techniques used to assess the toxicity of industrial compounds.

— Title: Mechanisms of Behavioural Changes Induced in Various Animal Species Exposed to Very Low Concentrations of Toxicants.

Objectives and Findings:

Spontaneous motor activity increased by low concentrations and depressed by higher concentrations. Good correlation between experimental animal data and human exposure findings.

Specific Objective: To determine the mechanism of behavioural changes occurring as a result of exposure to low concentrations of toxicants.

PUBLIC HEALTH ENGINEERING DIVISIONEdmonton Region

— Title: Lake Pollution, Fort Franklin, N.W.T.

Date: Began, May 1965 - November 1967.

Objectives and Findings:

Objectives - To determine the best location for a water intake, and disposal points for effluent from sewage lagoons in Fort Franklin.

Findings to date -

1. There are water currents parallel to the shore which require the water intake and sewage and shore drainage to be separated by a long distance at right angles to the shore.
2. The best location for a water intake is 500 ft. offshore, beyond the wharf. (this is now being planned).
3. Sewage lagoon effluent may be discharged during the summer when certain specified wind conditions exist.

Specific Objective: To recommend the relative locations of water intakes and sewage lagoon effluent disposal points and operational methods.

— Title: Northern Pipeline Study.

Date: Began April 1966, Continue indefinitely.

Objectives and Findings:

Objectives - To evaluate pipelines for use in settlements in water supply and sewerage systems in the Northwest Territories.

Findings to Date -

1. Burying pipes as little as one foot in Arctic Climate reduces the heat loss by approximately 50%
2. Types of construction have been evaluated for cost, ruggedness, etc.

Specific Objective: To recommend types of pipelines, which can be used in the Northwest Territories, heat required, etc.

— Title: Evaluation of Household Septic tanks, Sewage Pump-out tanks, Water Reservoirs, Water Haulage tanks, Sewage Haulage tanks in use in the Northwest Territories.

Date: Began, May 1966 - October 1968.

Objectives and Findings:

Objectives - To investigate relative merits of tanks of types stated;
which are in use in the Northwest Territories.

Findings to Date -

1. Burried tanks in the Arctic regions (not sub-Arctic) are very difficult to maintain, and it is preferable to enclose them in the utility room and crawl spaces of the buildings.

Specific Objective: To recommend types of tanks and desirable features, locations in buildings, etc.

— Title: Water Pollution Study, Mackenzie River.

Date: Began September 1966 - October 1967.

Objectives and Findings:

Objectives - To study localized conditions of pollution in relation to water supplies in the Mackenzie River.

Findings to Date -

1. Dilution is so high that pollution effects are strictly local.

Specific Objective: Contributes to our background information for planning water supplies and sewage disposal in the Northwest Territories.

— Title: Limnological and Water Pollution Study, Waterton Lakes National Park.

Date: Began, May 1967 - September, 1967.

Objectives and Findings:

- Objectives -
1. To assess sewage pollutant loads to the receiving water.
 2. To study pollutant effects on the stream and lake biotic relationships.
 3. To determine the degree of sewage treatment required to prevent eutrophication of the lakes.

Findings to Date - There is no severe pollutant load or adverse effect on the lakes, however detailed evaluation of the data is not completed.

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Specific Objective:

1. Abatement of water pollution in federal facilities.
2. To advise the National Parks Administration regarding the extent of eutrophication in the lakes.

— Title: Comparative Study of Indoor Toilets Suitable for use in the Northwest Territories.

Date: Began, May 1967 - November, 1967.

Objectives and Findings:

Objectives -

1. To evaluate comparative costs relative to esthetic acceptability, of the various toilets which are available on the market.
2. To evaluate their relative advantages and disadvantages.

Findings to Date -

1. The incinerator type of toilet is uneconomical mainly because of the high cost of power in the Northwest Territories.
2. The closed-cycle toilet systems do not appear to be of value because they are neither esthetically acceptable (not pleasant appearing and often odorous) nor economical.
3. Further studies are in progress.

Specific Objective: To provide information for planning engineers and administrations in the Northwest Territories.

— Title: Laboratory Study of the Effects of Bactericides on Iron Bacteria.

Date: Began, September, 1967 - March, 1968.

Objectives and Findings:

Objectives - To culture iron bacteria in natural water and test the effect of various bactericides.

Specific Objective: To supply information to the many people who enquire with this office on account of our technical papers in this subject.

— Title: Limnological and Water Pollution Study, Jasper National Park

Date: Began, May, 1967 - September, 1968.

Objectives and Findings:

Objectives -

1. To assess sewage and Industrial waste load to the Athabasca River and tributary system.
2. To study pollutant effects on aquatic biotic relationships including bacteria within the parks, and the effect of Industrial waste discharge on the stream biotic downstream from the park.
3. To determine the degree of sewage treatment required to prevent eutrophication of the lakes in the park.

Findings to Date - None to date. (Preliminary survey in the park completed).

Specific Objective:

1. Abatement of water pollution in federal facilities.
2. To advise the National Parks Administration regarding the extent of eutrophication in the lakes.
3. To prepare recommendations for the treatment and control of pulp mill wastes discharged to streams.

— Title: Ozonization of phenolic wastes.

Date: Began, April 1967 - 1970.

Objectives and Findings:

The objective of the project is to develop an economical method for treating phenolic wastes to render them inoffensive. The program is in its early stages. It has involved the study of the reaction between ozone and pure phenol in aqueous solution. The effect of various parameters on reaction efficiency is being studied. It has been found that phenol can be readily degraded by treatment with ozone. The mechanism of the reaction is under development.

Specific Objective: This project is part of the Pollution Abatement Research Program being developed by the Public Engineering Division.

PUBLIC HEALTH ENGINEERING

SELECTED PROJECTS, WATER POLLUTION

1. The toxic action of ozone and the kinetics of sewage bio-oxidation.
2. The measurement of long-term water pollution trends by biological methods.
3. The reclamation of domestic water and sewage disposal.
4. The improvement of aerobic treatment systems, especially as they apply to individual households.
5. The development of new criteria for the design of small waste treatment units.
6. The investigation of the biological and physical behaviour of sewage lagoons under extreme temperature variations.

RADIATION PROTECTION DIVISIONRadiation Protection

— Title: Personnel Dosimetry Services.

Date: Began, 1951 --

Objectives and Findings:

Objective is to determine and keep record of exposures of radiation workers in Canada. About 20,000 are on service. Research development is required in introducing new techniques to meet special problems, e.g. neutron exposures. Apart from their usefulness to individual subscribers, the results are analyzed statistically to determine trends and identify particularly hazardous occupations.

Specific Objective: Surveillance to protect workers from excessive radiation exposures.

— Title: Fallout Monitoring (Basic Canadian Program)

Date: Began, 1955 --

Objectives and Findings:

Objective is to determine amounts and kinds of fallout isotopes in environment, food and humans. Program in 1967 included determination of gross beta activity in air and rain, Sr-90 and Cs-137 in milk, Sr-90 in human bone. This is a reduction in the scope of the program from the previous year.

Levels in air and rain are negligible (except immediately after Chinese tests); levels in milk are declining but still high. The Sr-90 levels are much higher than in adults, but relative to previous years have shown a decrease in 1967.

Specific Objective: Determination of radiation exposure of the population.

— Title: Fallout monitoring (assistance to foreign countries).

Date: Began, 1960 --

Objectives and Findings:

Objective is to assist less developed countries in fallout studies under a U.N. commitment.

The Sr-90 levels in food samples from Pakistan were less than in comparable Canadian foods.

Specific Objective: International co-operation in fallout studies.

— Title: Reactor Environment Monitoring.

Date: Began, 1960 --

Objectives and Findings:

Objective is to ensure that radioactive isotopes from nuclear reactor installations do not contaminate the environment.

To date, two unexpected releases into the Ottawa River have been detected from results of tests on water samples from points downstream of Chalk River.

Specific Objective: Surveillance of uses of radiation sources to protect public.

— Title: Statistics of Radiation Protection.

Date: Began, 1962 --

Objectives and Findings: This project currently includes the following studies: -

1. Statistical analysis of exposure of radiation workers using personnel dosimetry records.
2. Analysis of a milk consumption survey.
3. Statistics of Uses of Radioisotopes in Hospital.
4. Information retrieval in assessment of Radioisotope licence applications.

Specific Objective: Assessment of population exposures and the effectiveness of control programs.

— Title: Fallout Monitoring (Special for Canadian North)

Date: Began, 1962 --

Objectives and Findings:

Objective is to determine magnitude and trend of Cs-137 levels in Eskimo population, caused by special food-chain factors (The mechanisms involved a subject of a separate study).

In 1967 the levels of Cs-137 in Eskimo urine specimens were somewhat lower than in previous year; levels in caribou meat were unchanged. Amounts in human body were also determined by whole-body counting and results compared with the urine analyses. The highest body burdens approach (but are less than) the ICRP recommended limit for permissible exposure.

Specific Objective: Health effects of radiation exposure of the population.

— Title: Determination of range of normal thyroid weights in the child population.

Date: Began, 1962 --

Objectives and Findings:

Objective is to obtain information needed for a precise estimate of radiation dose from I-131 to the thyroid.

Data for the relationship between body wt. and body area, age and thyroid mass for young 0 - 3 age groups are now complete and data is being collected for older age groups. The variational error is to be determined by statistical analysis.

Specific Objective: Assessment of health effects of nuclear weapon fallout on Canadian population.

— Title: Development of Analytical Techniques for the Determination of Radioisotopes in human tissues and other materials.

Date: Began, 1963 --

Objectives and Findings: This project currently includes the following studies:

1. Determination of C^{14} and Tritium by liquid scintillation techniques.
2. Determination of radium and its daughter products, radon, polonium and lead by radiochemical methods.
3. Intercomparison and evaluation of alternative radiochemical methods for analysis of industrially important radioisotopes such as uranium, thorium, radiophosphorous, etc.
4. Improvements in instrumentation for gamma spectroscopy, particularly as applied to whole body counting.
5. Application of atomic absorption flame spectrophotometry to analysis of stable trace elements.

Specific Objective: Improvements in the control of radioisotope in industrial, medical and research applications, and in the investigation of environmental levels of fallout, etc.

— Title: Development of Physical Radiation Dosimetry Systems.

Date: Began, 1963 --

Objectives and Findings: This project includes the following studies:-

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1. Determination of Neutron dose by counting recoil protons in nuclear emulsions.
 2. Determination of neutron dose by activation of stable elements.
 3. Determination of gamma dose by thermoluminescent techniques.
- The work, so far, has led to the introduction of a Neutron Dosimetry Service and a Criticality Dosimeter Service for application to special groups of exposed workers.

Specific Objective: The assessment of radiation dose in radiation workers and population groups and the application of new techniques in personnel dosimetry.

— Title: Standardization, Calibration, Quality Control and Laboratory Intercomparison projects.

Date: Began, 1963 --

Objectives and Findings: This project includes:-

1. Absolute determination of radioisotopes by 4 pi counting techniques.
2. Investigation of factors affecting determination of radioisotopes by sample counting methods; e.g. self absorption geometry, etc.
3. Optimization of geometrical and other arrangements for whole body counting.
4. Participation in interlaboratory comparisons with laboratories in the U.S. and Ontario.
5. Participation in interlaboratory correlations with the International Atomic Energy Agency.

Specific Objectives: Efficiency of laboratory operations and reliability of results.

— Title: Cs-137 in Human body

Date: Began, 1965 - 1969.

Objectives and Findings:

Objective is to clarify metabolism of Cs-137 in body in order to understand uptake and elimination of this important fallout isotope. Investigation includes feeding caribou meat, containing fallout Cs-137 to volunteer subjects and analyzing the subject and his excreta as a function of time. A report is in preparation.

Associated with this study is the determination of Cs-137 levels in the bodies of a group of high school students, using whole body

counting techniques.

Specific Objective: Health effects of radiation exposure of the population.

— Title: The Natural Radiation Background.

Date: Began, 1965 --

Objectives and Findings:

Objective is to determine the nature and distribution of naturally occurring radiation sources where significant in terms of human health.

Currently, the only work in progress in this area is the radiochemical analysis of drinking water and samples from St. Lawrence, Nfld. in co-operation with the Occupational Health Division which has been studying the epidemiology of cancer in the miners there. An attempt is being made to determine whether such cancers are radiation induced. Rather high levels of radium have been found in some urine specimens, high radon levels in the drinking water.

Specific Objective: Assessment of health effects of radiation exposures.

— Title: Radiation biology: Blood cell effects.

Date: Began, 1965 --

Objectives and Findings:

The objective is to study the biochemical and morphological changes occurring in peripheral blood lymphocytes following irradiation.

The method gives promise as a sensitive and reliable measure of radiation exposure.

Specific Objective: Assessment of health effects of radiation exposures to man.

— Title: Strontium-90 and Cesium-137 in Canadian diets.

Date: Began, 1965 --

Objectives and Findings:

Determination of Sr-90 and Cs-137 in 'teenage' diet has been commenced and is expected to continue.

Analysis of the first year's results (1967) shows that the non-milk dietary strontium contribution is much larger than had been expected and constitutes an appreciable proportion of the total strontium in the diet.

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Specific Objective: Assessment of health effects of ingestion of nuclear fallout by Canadian population.

— Title: Instrument Development,

Date: Began, 1965 --

Objectives and Findings:

Objective is to develop better techniques for radiation protection program. The development work includes:-

1. Improvement in the whole Body Counter installation by reducing the effect of background radiations.
2. Development of a portable whole body counter.
3. Development of an automatic processor for film dosimeters.
4. Development of a special single-channel pulse height analyzer for determination of I-131 in environmental monitoring.

Specific Objective: Improvement in radiation protection techniques.

— Title: Thorium in Human body (Thorotrast).

Date: Began, 1966 --

Objectives and Findings:

The objective is to obtain knowledge of dose effect relationships at and around maximum permissible levels of dose to (a) lung (b) bone marrow (c) skeletal bone by a study of patients who had received "thorotrast" in clinical investigation.

This study is sponsored by the W.H.O. and our participation in it has involved preparatory visits and discussions with potential collaborating centres in Europe and U.S.A.

Specific Objective: Health effects of radiation exposures.

— Title: Contamination of reactor environments by air-borne effluents.

Date: Began, 1966 - 1967.

Objectives and Findings:

Objective is a theoretical study of the diffusion of gaseous effluents from the stack of a nuclear reactor. Various theoretical models are compared with published experimental data. A report will be published.

Specific Objective: Surveillance of radiation sources that may cause radiation exposure of the public.

— Title: Unwanted radiation exposures in X-ray applications.

Date: Began, 1966 --

Objectives and Findings:

Objective is to study equipment characteristics and technician techniques which will minimize unnecessary and unwanted exposures in diagnostic, therapeutic and industrial applications of x-rays.

A Survey of Dental X-Ray equipment has indicated that most installations can be improved by relatively simple modifications.

Specific Objective: Assessment of radiation exposures of the population.

— Title: Radiation Biology: Cytogenetic effects.

Date: Began, 1966 --

Objectives and Findings:

The objective is to study irradiated human tissues and observe the resulting aberrations in the chromosomes of the cells. In-vitro culture techniques are used.

The method shows promise as a sensitive measure of radiation dose and a possible indicator of radiation induced disease.

Specific Objective: Assessment of health effects of radiation exposure in man.

— Title: Body Burden Assay Service.

Date: Began, 1967 --

Objectives and Findings:

Objective is to provide radiation workers with information on amounts of radioisotopes that may have been ingested or inhaled, by means of analysis of breath or urine.

Research development is involved in this work because each radioisotope presents a separate analytical and health problem.

Specific Objective: Surveillance of uses of radiation sources to protect workers.

— Title: Uranium in Human body.

Date: Began, 1967 --

Objectives and Findings:

Objective is to study all aspects of ingestion and inhalation of Uranium in industrial work and the health effects of U. in the body. Workers dealing with fabrication of uranium fuel for nuclear reactors have been found (by whole body counting and urine analysis) to have inhaled considerable quantities of Uranium dust. An intensive study of workers at the plants involved is in progress.

Specific Objective: Surveillance of uses of radioactive materials to protect workers and public.

— Title: Radioisotopes in the Lichen-Caribou-Man food chain.

Date: Began, 1967 - 1969

Objectives and Findings:

Objective is to determine mechanisms involved in the observed fact that levels of Cs-137 and other radioisotopes are higher in Eskimos than in other Canadians. The Health situation has been covered by a separate fallout monitoring program for the North (q.v.) but an intensive investigation of mechanisms was found necessary to clarify the picture.

Extensive sampling of lichens, caribou, and humans in the Inuvik area was carried out in summer of 1967.

Specific Objective: Health effects of radiation exposures of the population.

LABORATORY OF HYGIENEClinical Laboratories

- Title: The Evaluation of Fluorescent Treponemal Antibody Techniques (FTA-200 and FTA-ABS) for the Serodiagnosis of Syphilis.

Date: Began, 1964, Continuing project.

Objectives and Findings:

In these fluorescent treponemal antibody procedures, the virulent Nichols strain of *T. pallidum* is used as antigen. It is claimed that the FTA-ABS technique is as specific and sensitive as the TPI test. These procedures are being evaluated by comparison with the TPI test as well as other serological tests.

June 1967 - studies are continuing.

Our Laboratory is now providing a service to provincial laboratories in Canada of supplying reference reagents for the FTA-ABS test.

Specific Objective: Improved methodology in syphilis serology.

- Title: Production and Purification of Neutralizing Myxovirus Antibody and Possible Extension to Include Other Virus.

Date: Began, June 1965 - December 1967.

Objectives and Findings:

Myxoviral antibody was developed in goat milk serum following infection of one-half of the goat udder by influenza virus. By means of electrophoresis and separation of the protein fractions by gel filtration an antibody has been isolated and purified to a high titer.

A preliminary report of our findings was presented at the annual meeting of the Canadian Society of Microbiologists in June 1966.

This study is being continued.

The technique has been extended to Adeno-3 and mumps viruses. Two papers have been accepted by the Canadian Journal of Microbiology.

Specific Objective: Collaboration with the Ottawa Civic Research Committee on a more economical source of viral antibody.

- Title: A Specific Staining Method for B-Alanine on Chromatograms.

Date: Began, September 1965 - 1967.

Objectives and Findings:

Preliminary experimentation has indicated that it may be possible to

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develop a specific staining method for B-Alanine on paper chromatograms.

June 1967 - No further work.

Specific Objective: To improve our methods in clinical biochemistry.

____ Title: Investigations of Amino Acid Patterns in Plasma and Urine of Patients Suspected of Showing Amino Acid Abnormalities.

Date: Began, January 1966 - Continuing Project.

Objectives and Findings:

This is the establishment of amino acid patterns by means of the Technicon Amino Acid Analyzer for specimens from patients showing evidence of abnormalities on chromatographic screening. For example, the family of a mother with Fanconi Syndrome have produced interesting data.

June 1967.

For the past year, our laboratory has screened selected Ottawa Civic Hospital patients for amino acid abnormalities by using chromatographic and electrophoretic techniques. The Hospital took over this function in April 1967 and our laboratory will now be called upon only for special investigations.

A paper on the advantages and disadvantages of chromatography, high voltage electrophoresis and automated amino acid analysis is being drafted.

Specific Objective: To improve our methods in the early detection of disease.

____ Title: Detection of vanilmandelic acid (VMA) on High Voltage Electrograms.

Date: Began, January 1967 - December 1967.

Objectives and Findings:

Preliminary study indicates that at pH2, VMA migrates to the positive side, whereas the acidic amino acids do not. Use of a diazo staining technique may make it possible to detect VMA in the course of amino acid screening procedures. The determination of VMA is important in the diagnosis of tumors of chromaffin tissue, the pheochromocytomas.

Specific Objective: Improved methodology in clinical chemistry.

Virus Laboratories

— Title: Research on the development of more sensitive and simpler safety tests for polio vaccines.

Date: Began, January 1960 - Continuing project.

Objectives and Findings:

This project has been proceeding for many years in the Virus Laboratories and various improvements have been achieved in the control testing procedures of polio vaccines. With the large-scale administration of live, oral poliovirus vaccines in Canada there has been a great deal of interest in the laboratory analysis of poliovirus strains isolated from healthy and paralytic patients fed the vaccine. Extensive studies were carried out in this laboratory to determine the genetic characteristics of those poliovirus strains.

PROGRESS NOTE: The results of the third part of these studies will be summarized and published in the near future. Further, experiments are in progress on Sabin Type 1 poliovirus strains isolated from infants 1 to 6 weeks after vaccination.

Specific Objective: The control of polio vaccines.

— Title: Research on the development of potency and safety tests for the assay of measles vaccines.

Date: Began, June 1960 - Continuing project.

Objectives and Findings:

This project has been proceeding for many years in the Virus Laboratories and various improvements have been achieved in the control testing procedures of measles vaccines. Several vaccination programs were carried out in the past years with various live, attenuated measles vaccines in children and the clinical safety as well as the immunogenic potency of these vaccines were critically evaluated.

PROGRESS NOTE: Upon the request of the Connaught Medical Research Laboratories, two series of experiments were carried out in this laboratory to improve the potency testing procedures of inactivated measles vaccines. Serological tests were performed on Indian and Eskimo sera for measles antibodies prior to and after vaccination programs.

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A simple and rapid serological assay was developed for the titration of live, attenuated measles vaccines.

Further serological surveys are in progress on human sera and attempts are made to develop a more sensitive measles haemagglutination-inhibition test.

Specific Objective: The control of virus vaccines.

— Title: Cytological monitoring of tissue cultures.

Date: Began, September 1962 - Continuing project.

Objectives and Findings:

Systematic analysis of chromosomal constitution of all primary cells, cell strains, and cell lines is necessary to guard against accidental contaminations of cell cultures with cells of different origin and to detect chromosomal shifts in populations of cultured cells. The monitoring is a prerequisite for maintaining the validity of tests in which tissue cultures are used.

In addition to the primary cells, cell strains, and cell lines reported previously, four African Green and three Thesius monkey cell lines established in our laboratory, as well as a new FL subline received from the Sloan-Kettering Institute, have been systematically followed up to establish their identity from their typical chromosomal numbers and presence of specific chromosomal markers.

The evaluation of the changes in the chromosomal constitution of cell strains and cell lines is based on comparison with the normal karyotype of the animal from which the line has been derived. Preliminary work on normal karyotypes of Rhesus and African green monkey has shown that some chromosomes and even chromosomal arms shrink out of proportion with the average contraction of the whole chromosomal set. The uneven contraction distorts the two parameters by which individual chromosomes are identified, namely the percentage of total complement length and the ratio of the length of the short arm to the length of the long arm. An attempt is being made to analyze this complex relationship caused by differential contraction by advanced statistical techniques such as calculation of correlation and regression. The detailed data will make possible the detection of minute changes in morphology of some chromosomes that may accompany cellular transformation. The work on Rhesus karyotype is nearing completion and work on African green

karyotype has been started.

Specific Objective: The improvement of our diagnostic services and control of virus vaccines - in which tissue cultures are used.

— Title: Irradiation of Serum.

Date: Began, July 1962 - January 1968.

Objectives and Findings:

To determine (1) the effects of low and high levels of gamma radiation on the antibody content of stored sera and
(2) the possibility of sterilizing sera by gamma irradiation.

PROGRESS NOTE: Sera containing antibodies to influenza or polio have been irradiated with various doses of gamma irradiation. It has been found possible to inactivate virus in the serum without destroying the antibody.

Work on this project was temporarily suspended on July 1, 1966, and has not been continued due to a shortage of staff; it is hoped to resume it as soon as possible.

Specific Objective: To improve our diagnostic services and to reduce some of the dangers to the staff in the handling of specimens.

— Title: Research on the development of standard assays for the titration of rubella virus and for control testing procedures of rubella vaccines.

Date: Began, January 1964 - Continuing project.

Objectives and Findings:

Recently various laboratories reported the successful isolation and propagation of rubella virus in different tissue cultures. Experimental work was initiated in our laboratories to propagate rubella virus in tissue cultures and to develop various control testing procedures of the vaccines to be submitted by manufacturers probably in the near future.

PROGRESS NOTE: An international collaborative study on rubella sponsored by the WHO was completed last year. Experiments were carried out to standardize the indirect

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serum neutralization test and to determine the rubella antibody content of 200 sera collected from females in child-bearing age. The results were summarized and sent to WHO for publication.

Experiments were performed with limited success to develop a rubella complement fixation test.

A live attenuated rubella vaccine virus was received from the NIH, Bethesda. After the production of a reference seed lot of this virus in this laboratory, attempts are being made to establish the various marker tests for the characterization of the vaccine virus. Five new tissue culture cell lines are being introduced in our laboratory for this purpose. Experiments are in progress to develop a rubella haemagglutination-inhibition test for the rapid diagnosis of rubella infection.

Specific Objective: The control of virus vaccines.

— Title: Research on the development of simple virus-tissue culture assays in the Microtiter system.

Date: Began, May 1964 - Continuing Project.

Objectives and Findings:

The serological micro technique, based on the use of Plexiglas or disposable plastic plates and spiral loops, uses minute quantities of reagents and makes possible a new exactitude in viral serological investigations. This technique has been adapted recently to conventional tissue culture procedures. Briefly, the disposable plastic titration plate simulates a series of micro tissue culture tubes in which cell monolayers are grown on the hemispherical bottom of each cup. Rapid serial dilution of virus or serum can be accurately accomplished by loop transfer in the micro-cups prior to the addition of the tissue cell suspension.

PROGRESS NOTE: A simple 3-day test was developed for the titration of polioviruses and a 5-day test for the titration of "wild" and attenuated measles viruses. Results of these experiments were summarized and accepted for publication. Further experiments are in progress to determine the quantitative aspects of the serum-virus combination in the micro serum neutralization test.

Attempts are made to develop a micro-assay for the titration of rubella virus.

Specific Objective: The control of virus vaccines.

— Title: Gamma irradiation of various viruses.

Date: Began, September 1964 - January 1968.

Objectives and Findings:

The gamma irradiation of various viruses under different conditions of temperature, pH, volume and medium is being studied with a view to developing a method for the preparation of vaccines from viruses grown in tissue culture.

The first phase of this project is almost completed and it is expected that the results will soon be published. From this work a new improved antigen for the diagnosis of W.E.E. was developed and a report presented at the Canadian Society of Microbiologists meeting in June 1966.

Progress on this project has been limited, due mostly to lack of available time and personnel: as soon as other projects are completed, it is hoped to actively resume this investigation.

Specific Objective: The control (safety and efficiency) of virus vaccines.

— Title: Establishment of new tissue culture cell strains and cell lines.

Date: Began, 1964 - Continuing project.

Objectives and Findings:

Cell strains resembling closely the primary cells became recently important for vaccine control and diagnostic work. Moreover, early passages of continuously growing tissue cultures represent ideal material for the study of spontaneous cellular transformation in vitro.

Attention was focused especially on African Green and Rhesus monkeys since the cells of these species are susceptible to a number of viruses. Concentrated effort was therefore made to establish cell strains from these species and to use these strains instead of the only African green cell line BSC-1 which is not any longer available in low passages.

PROGRESS REPORT:

To the previously reported four African Green monkey cell lines, three newly established Rhesus monkey lines have been added. The sublines, derived from these cell lines now having been successfully passaged 80-90 and 55 times respectively, show very good growth, and were made available to the Vaccine Testing Section and Diagnostic Section of our Laboratories, as well as to the Biological Control Laboratories. The Rhesus monkey cell lines resemble closely in their chromosomal make-up the primary cells, but their growth rate is greatly accelerated. A report on the cytological constitution of the African Green monkey cell lines was presented to a scientific meeting.

Even cell lines derived from the same kidney differ from each other in range and modal chromosomal numbers, chromosomal markers, and degree of polyploidy, as well as in their characteristic morphological appearance and rate of growth.

Specific Objective: The improvement of our diagnostic services and control of virus vaccines by providing better "cell lines" for virus culture.

— Title: Factors influencing the chromosomal constitution of primary and transformed cells propagated in vitro.

Date: Began; January, 1965 - Continuing

Objectives and Findings:

The early passages of tissue culture material derived from normal primary cells represent a transitional stage between primary cells which would grow for a limited time period only and cell lines capable of indefinite growth. In their chromosomal constitution these cells resemble closely primary cells, but have somewhat faster growth rates than primary cells. There is a possibility that the cells in this stage could still be reversed to the status of normal cells. Such an attempt will be made using different biochemicals and changes in culture conditions. Serological techniques will be used in an attempt to identify any viral agents which may have caused the transformation. Results of such a study may contribute to the knowledge of carcinogenic processes and the possibility of reversal of malignant transformation.

The material suitable for this study has been produced and is stored in our tissue culture bank. A detailed study of the effect PPLO (Pleuro-Pneumonia-Like-Organisms) contamination and liquid nitrogen storage on the chromosomal constitution of cells is in progress.

The preliminary analysis of karyotype of the early passages of new cell lines has shown that each cell line develops independently of other cell lines established from the same kidney. Thus after 75 passages two new Rhesus kidney cell lines resemble closely the primary culture in both their chromosomal constitution (with modal chromosomal numbers of 42 and 43, respectively) and fibroblast like morphologh while the third line derived from the same material has a modal chromosomal number of 48 and is composed of epithelial like cells.

Specific Objective: The improvement of our diagnostic services and control of virus vaccines - in which tissue cultures are used.

Title: The development of a method of characterizing neutralizing antisera particularly echovirus antisera to obviate the errors due to virus dose variation and due to variation in avidity.

Date: Began; October, 1965 - October, 1967

Objectives and Findings:

The use of the classical method of standardizing neutralizing antisera using stock strains does not necessarily reflect the action of the antiserum with wild strains of virus. To overcome this a number of modifications have been employed to which the most promising appears to be a short two dimensional titration in which a plateau of neutralizing activity can be identified.

Within the limited amount of work completed it appears that the method goes a long way towards obviating discrepancies due to variation in virus dosage and the graphic characterization gives more information of the serum characteristics than the classical method.

Specific Objective: To improve and speed up the identification of enterovirus.

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- Title: Chromatographic purification of soluble diagnostic antigens
Date: Began; March 1, 1967 - March 1, 1968
Objectives and Findings:
To develop a larger scale purification procedure for routine production of these antigens.
Specific Objective: The improvement of our virus diagnostic services.
- Title: Purification and concentration of diagnostic antigens prepared from tissue culture fluids.
Date: Began; March 1, 1967 - December, 1968
Objectives and Findings:
To develop methods for the concentration of antigens from large volumes of tissue culture fluids, followed by their purification. Attempts will be made to adapt chromatographic and co-precipitation procedures for this purpose.
Specific Objective: The improvement of our virus diagnostic services.
- Title: Preparation of non-infective measles diagnostic antigen.
Date: Began; March 1, 1967 - March 1, 1968
Objectives and Findings:
To prepare a non-infective diagnostic antigen of satisfactory potency and specificity for use in the complement fixation test.
Specific Objective: The improvement of our virus diagnostic services.
- Title: Research on the improvement of potency tests for smallpox vaccines.
Date: Began; July, 1967 - July, 1968.
Objectives and Findings:
The new WHO Requirements on Smallpox Vaccines state that the titration of the vaccine on the chorio allantoic membranes of chick embryos be used as the official test for potency.
Attempts will be made to establish the reproducibility of this test using glycerinated and freeze-dried vaccines. The effect of various manipulations (sonification, heat-inactivation etc.) on the potency of these vaccines will be investigated.
Specific Objective: Our control of virus vaccines.

Zoonoses Laboratory

— Title: The natural history and public health importance of rickettsial disease agents, Rickettsia rickettsi and Coxiella burnetii, in Canada.

Date: Began; November, 1961 - Continuing

Objectives and Findings:

American dog ticks were obtained from Pinawa, Manitoba, and tested for RMSF. Evidence of the occurrence of this disease in that area was obtained by guinea pig inoculation. All specimens were inoculated into embryonated eggs as well and smears of the harvested material from one pool contained a few rickettsiae. No isolates from Ontario dog ticks have been obtained although guinea pig inoculation trials have repeatedly confirmed the presence of the agent in these ticks. Seventeen rickettsial isolates have been obtained from rabbit ticks in the Richmond, Ontario, area. Three of these have been shown to be RMSF agents. Attempts to date to label R. rickettsi with I^{131} for use in the radioisotope precipitation (RIP) test have given products with only low specific activity.

RIP tests for Q fever antibody of persons in contact with Q fever positive herds in central Ontario have shown that 43 per cent had had experience with C. burnetii. The corresponding figure for the complement fixation tests was 35% while the capillary tube agglutination tests showed only 1.4% as reactors.

Specific Objective: The importance of zoonoses in Canada.

— Title: The natural history and public health importance of Colorado tick fever and California encephalitis in Canada.

Date: Began; June, 1962 - Continuing

Objectives and Findings:

A total of 124 pools of ticks from Ontario and Alberta were tested for Colorado tick fever without finding the virus.

In order to obtain an estimate of the possible public health importance of CE, 512 sera from the Carleton Place and Kemptville hospitals have been tested by the tissue culture neutralization test for CE virus antibody. Thirty-four were found positive giving an incidence of 7 per cent. Three Indian reserves in Western Ontario (Six Nations, Muncey and Walpole Island) were visited and blood samples obtained

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from 324 volunteers. Of these, 168 persons (34%) were positive. At Muncey, where the highest incidence was found, 68% of the 1966 collection was positive. There was no difference in reaction rates between males and females. The younger age group (6-20) reflected a much higher incidence than did the older groups.

Specific Objective: The importance of zoonoses in Canada.

— Title: Serological typing of *Pasteurella multocida*.

Date: Began; June, 1962 - Continuous

Objectives and Findings:

Production of adequate quantities of antisera against capsular and most of the somatic antigens involved in serotyping by the Japanese method has been achieved. One strain for use in the production of a serotyping antiserum was found grossly contaminated. Enquiry of the Japanese donor revealed that the strain had been contaminated at source but that efforts were being made to retrieve it from early material.

Complete cross-testing of the antisera produced to date has shown no troublesome cross-reactions.

Contrary to reports on the Japanese reference strains, satisfactory antisera against different *P. multocida* serotypes are difficult to produce.

Specific Objective: A diagnostic service to the provinces.

— Title: Studies on tick-borne diseases and vector control methods on Ontario Indian Reservations.

Date: Began; 1964 - Continuing

Objectives and Findings:

Statistical analysis of the results of the 1966 tests of Brushkiller-DDT and Brushkiller-lindane as tick control methods showed that the former applied at 2 lb. insecticide component per acre gave very satisfactory results. The latter was not adequate for the purpose because of low persistence. A report on this work has been accepted for publication.

In order to make available an alternative chemical control preparation Brushkiller-fenthion was formulated and field tested at 1 and 2 lb. fenthion per acre. Brushkiller-DDT was used as the standard for

comparison. Preliminary results indicate that Brushkiller-fenthion is a very useful tick control product.

The plots to test the effect of cultivation on controlling ticks were evaluated. These plots were established at the Six Nations' Indian Reserve in 1965. Data showed that whereas tick prevalence on the control plots for 1 year had reduced the tick population by a factor of 6.7 where a wheat-grass combination was used and 7.1 where oats-grass was used.

Specific Objective: The importance and control of zoonoses in Canada.

Rehabilitation ServicesProsthetic Services

— Title: Development and evaluation of improved techniques into prosthetics and orthotics production.

Date: Began; 1948 - Continuing

Objectives and Findings:

1. Introduced the B.K. Alignment Jig into production
2. Developed a very useful B.K. Prefabricated Socket for preparatory prostheses, and introduced it into production.
3. Continuing development of the capability of fitting prostheses at any clinic. In addition to W.C.B., we have worked with Peterborough Civic Hospital.
4. Continuing development of Silicone Jell Pads for end bearing. They are being field tested on both B.K. and A.K. prostheses, and are being used with the Prefabricated B.K. Socket routinely.
5. Evaluation of Polysar continues.
6. Instituted an education program for Prosthetists and Orthotists.

Specific Objective: Improvement in prosthetic service and hardware through investigation, development, training, and introduction of improved techniques into prosthetics and orthotics production.

Blindness Control Section

— Title: Analysis of Causes of Blindness in Persons Granted Blind Persons Allowance

Date: Began; Fiscal Year 1959-60 - Continuing

Objectives and Findings:

Reporting of blindness in Canada is not mandatory and data on the prevalence of blindness, and the causes of blindness have been lacking, in spite of the interest and concern from many quarters, in the problems of blindness prevention.

Some 700 to 1,000 applications for blindness allowance are approved each year. It was felt that a continuing analysis of the causes of blindness in this group would be a useful source of information which might offer a basis for opinions on:-

1. The relative significance of various eye conditions as causes of blindness in this group.
2. The designation of priorities in eye research.
3. The development of eye care programs.
4. The effectiveness of various preventive, detection or treatment programs.

While the limitations of this data are evident, it is felt that the information has been of value toward the stated objectives, and this value is expected to be enhanced with further accumulation of data.

Specific Objective: Prevention of Blindness in Canada.

Dental Health Division

— Title: Utilization of Dental Services - Intra-mural project

Objectives:

To develop and test a methodology to determine the types and proportions of the various dental services sought by a public without financial barriers to securing service and with an adequate supply of services available within their community.

The securing of sufficient data of a type that is capable of providing the information desired. The data has been collected and is in the process of being analyzed by Research and Statistics Directorate, National Health and Welfare.

Assessment of Benefit or Value:

The provision of information not now available required for a rational assessment of the demand for services where no financial barrier exists.

Implication for Future Policy:

Fundamental data needed for estimating dental manpower requirements to provide a known level of preventive and treatment services.

— Title: National Dental Health Index

The field testing of the World Health Organization, International Dental Epidemiological Methods Series, Manual No. 3, Dental Health Evaluation

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Level A Survey, on a national basis with the co-operation of the Provincial Departments of Health.

Objectives:

To familiarize the dental public health personnel in all provinces with this Dental Epidemiological Method and to train and assist them in conducting the Field Trial within their respective provinces.

To gather data on a scale to permit the production of a National Dental Health Index.

To provide recommendations to World Health Organization as to improvements in the methodology leading toward greater accuracy and a more uniform interpretation of the Manual of Instruction. The provinces are co-operating, without subsidization from the Federal Government, in this project to achieve standards productive of meaningful results.

Assessment of Benefit or Value:

All provinces are co-operating in this project to acquire knowledge and skills in dental statistics and epidemiology.

Implication for Future Policy

Important liaisons and working arrangements are being developed that will be essential for the development of a National Dental Health Index on a continuing basis.

Title: Attendance at Dental Office

Data upon the proportion of the child and adult population of Canada now utilizing dental services.

This project is with the co-operation of the Labour Force Special Survey - Dominion Bureau of Statistics.

Objectives:

The objectives are to provide estimates based upon direct interviews of individuals in the Labour Force Survey Sample that should be more reliable than the estimates now obtained by inference from dentists' voluntary returns to questionnaires circulated to dentists by the Canadian Dental Association.

The securing of the data and the publication of the report. (The data has been secured and the report will be published by Fall, 1968.)

Assessment of Benefit or Value:

This information is essential for rational planning for dental manpower needed to improve the availability of services in the various provinces and territories.

It is a demonstration of another useful area of further collaboration utilizing the facilities of the Dental Health Division and of the Special Survey Branch of the Dominion Bureau of Statistics.

Implication for Future Policy:

The availability of the organization and the sampling frame of the Special Survey Branch of the Dominion Bureau of Statistics provides the means of obtaining data of many magnitudes better in areas in which previously only estimates of doubtful validity by the professional associations have been available.

— Title: Patient recall of the dental visits

The accuracy of recall by dental patients of the number of times they have visited the dentist in the period of one year was investigated. This project was conducted by the Royal Canadian Dental Corps at the suggestion of the Dental Health Division in the support of Project 3 as above.

Objective:

The objective is to provide an independent means of assessing the accuracy of recall of the people interviewed by the Labour Force Survey.

The project was conducted to a standard of useful results. The results are available to the Department of National Health and Welfare.

Assessment of Benefit or Value:

The results permit a more reliable interpretation of the results from Project 3.

Implication for Future Policy:

Useful liaisons and working arrangements in areas of general dental health significance have been demonstrated and established with the Royal Canadian Dental Corps.

— Title: Dental condition and treatment needs of young Canadian adults in the Armed Forces

This project is being carried out by the Royal Canadian Dental Corps with the advice and assistance of the Dental Health Division.

Objectives:

The objective is to provide data on the dental health and the treatment needs of an age group of Canadian adults on which no such data was previously available. This data pertains to the general public because it can be related to the factors of education and pre-service occupation in the non-service population.

The data has been collected and is being analyzed to provide the information required in sufficient accuracy to be useful.

Assessment of Benefit or Value:

Fundamental data required for planning of manpower requirements in the dental field.

Implication for Future Policy:

As above in Project 4.

— Title: Royal Canadian Dental Corps

A Royal Canadian Dental Corps project Dentists Time Required for the Provision of Specified Services.

Objective:

The objective is to provide factual data on the professional time required to perform the more commonly needed services in a group of young adults.

Assessment of Benefit or Value:

The study has provided data of sufficient reliability to be useful for manpower planning. The data will be available from the Royal Canadian Dental Corps for departmental use.

Implication for Future Policy

As above in previous projects with the Royal Canadian Dental Corps.

— Title: An examination of dental treatment programmes supported in whole or in part from public resources.

A Royal Canadian Dental Corps project Dentists Time Required for the Provision of Specified Services.

Objective:

To identify the sources of information with the co-operation of the Directors of Dental Health of the respective Departments of Health of the provinces.

To identify gaps in the information available.

To encourage the utilization of a standard method of reporting such programmes to provide meaningful information as to -

- (1) the population eligible for the programme;
- (2) the proportion of the eligible populations receiving service
- (3) range of service provided by the programme;
- (4) the method of financing the programme.

The securing of the desired information in sufficient quantity to be useful on a national basis and an improvement in the method of reporting such programmes.

Assessment of Benefit or Value:

Major gaps in the information were identified. Provincial Directors have been alerted to the desirability of closing gaps and establishing some measure of standardization in reporting these programmes.

Implication for Future Policy:

The requirement to develop and establish reliable information on these types of dental programmes at both provincial and national levels has been demonstrated. The value of continuing collaboration by the Provincial Dental Directors and the Dental Health Division of the Department of National Health and Welfare in developing useful standards of reporting has been shown.

General Comments Regarding Projects 1 to 7

The overall aim of these projects undertaken by or stimulated by the Dental Health Division is to develop methods of obtaining information not previously available or to improve the accuracy and reliability of that previously available, in particular, that needed for a realistic assessment of the dental health and needs of the Canadian population, the current standards of preventive and treatment services being received by the population and the manpower and other resources that will be required to achieve a reasonable standard of dental health in Canada through preventive measures and adequate treatment services.

— Title: Dental Health Education

Provide the technical data and the dental public health appraisal of the professional acceptability of existing material and for the development of new material.

Objective:

To ensure that the public and the profession receive technically accurate information suitable to encourage the improvement and preservation of the dental health and, therefore, the total health of Canadian citizens by promoting an increase in utilization by the community, the family, and the individual, of measures known to be safe, practical and effective in the prevention and control of dental disease.

The material is accepted by the profession of dentistry and Public Health as the major source of dental health education material in Canada.

Assessment of Benefit or Value:

Effective demand from provincial departments grossly exceeds what can be supplied.

Implication for Future Policy:

In Canada, as in many other countries, education of the individual and of the public concerning the tremendous health and economic advantages of fluoridation and other preventive dental health measures is still, in some areas, one of the main problems faced by health authorities at all levels of government and should be given high priority. There will be a continuing requirement to maintain the scientific quality of the dental health material produced.

Title: Emergency Health Services, Dentistry in:

The Division's program in this respect is to provide consultant services and other assistance to Emergency Health Services Division, to study the role of the dental profession in Emergency Health Services, to recommend ways in which the profession may provide effective cooperation in mass casualty care in disaster, to prepare and provide precis and technical papers, and dental personnel to the instructional staff of Emergency Health Services Division.

Objective:

To promote and facilitate the effective utilization of the dental profession in the event of national disaster and the procurement and maintenance of technical dental stores in the Emergency Health Services stockpile, by providing a dental adviser to the Emergency

Health Services Advisory Committee and to working parties on programs for undergraduate training in mass casualty care and by acting on behalf of Emergency Health Services as dental adviser to dental faculties in the organization and implementation of pilot programs in this respect.

Criteria for Measurement of Achievement:

Papers published in medical and dental journals, lectures given at Canadian Emergency Measures College and dental faculties, technical papers prepared by Dental Health Division and published by Emergency Health Services.

Assessment of Benefit or Value:

The attainment of the objectives is demonstrated as shown by the increasing number and the growing content of pilot programs for undergraduate training in mass casualty care. For example, one dental school now provides in addition to first-aid training, twelve specialization lectures on mass casualty care.

Implication for Future Policy:

The importance of liaison between Emergency Health Services and dental faculties through Dental Health Division has been established for the useful realization of such projects and the coordination of working arrangements in this respect.

Nutrition Division

— Title: The determination of food consumption patterns and nutritional status of the Canadian population.

Objective:

The development of guidelines for the conduct of surveys of dietary intake, food consumption patterns and nutritional status in order to obtain a comprehensive picture of the nation's nutrition, employing all available techniques.

The selection of a method or methods that can be used most efficiently either for large scale studies in breadth or for limited studies in depth to give a comprehensive picture of the nation's nutrition.

Assessment of Benefit:

The identification of groups at risk because of poor nutrition with an indication of the necessary means of correction such as education, food supplementation or a change in agricultural policy.

— Title:

The revision of standards for recommended nutrient intake in Canada (Dietary Standard for Canada).

Objective:

The updating of standards to conform with current scientific knowledge in consultation with specialists in the various fields of nutrition and with consideration given to international recommendations, such as those of the Food and Agricultural Organization, Rome, and the Food and Nutrition Board, Washington. A review of the protein requirements for Canadians was completed in 1967-68. Publication of the revisions as part of the Dietary Standard for Canada.

Provision of definite criteria for reasonable assurance of health due to nutrition for the majority of Canadians without encouraging excess.

Implications for Future Policy

The data are of great importance in times of food shortages and rationing and for determining agricultural policy.

Title: The development of models of recommended function and organizational settings for nutrition services within health departments.

Objective:

The assessment of the needs of the community for special nutrition services such as therapeutic diet counselling, feeding the elderly education of the public, low income counselling, home care plans, etc. The degree of cooperation from researchers and health agencies and the quantity and validity of the information gathered will influence the final decision on organizational models.

Assessment of Benefit:

The most effective and most economical organization for nutrition services within the whole public health structure, both local provincial and federal, voluntary and government supported.

Implications for Future Policy:

The results of this study would help academic institutions to design more effective programs to meet future needs; establish desirable administrative relationships and sharing of duties between federal and provincial nutrition divisions; help federal and provincial nutrition divisions to present the best possible estimates for staffing requirements for budgeting purposes.

Manpower Studies:

- A study is being conducted on model organizations for federal and provincial nutrition divisions.
- An investigation is being carried out on the nutritional needs of the community, consultive and educational, how they are presently being met and what will be future staffing requirements of health departments to meet the needs most economically and most effectively.
- Consultation with Department of External Aid on training courses and requirements for personnel from developing countries.

The Dietary Standard for Canada was first published in 1950 and revised completely in 1963. The protein requirements in this standard were updated in 1968 with consideration given to a revision in the new international standard published by FAO, 1965. There is regular updating of these standard recommendations to conform with current scientific knowledge.

13.2.4.1.2

HEALTH INSURANCE AND RESOURCES BRANCH

Hospital Studies UnitProject No. 1

Continuing Patient Assessment. Purpose is to develop a technique using clinical indicators, items of services, etc., which will make possible improved utilization of hospital services by the furnishing of current information on the status of patients.

Project No. 2

A replacement of surgical and paediatric hospital days by nurse visits to the home.

Project No. 3

Study of nursing personnel resources relative to patients' needs.

Project No. 4

Study to determine the adequacy of existing medical records and to propose new format.

Project No. 5

A study of the accuracy of recording of vital signs in hospitalized patients.

Project No. 6

Methodology for using geographic analysis in making facility planning decisions.

Project No. 7

Methodology for using multiple factors in making facility planning decisions.

Project No. 8

Methodology for analysing waiting lists as a source of information in making facility planning decisions.

Project No. 9

Methodology for using cost and output factors in making regional hospital service system planning decisions.

Project No. 10

Feasibility study of the use of a central computer by a number of hospitals.

Project No. 11

Identification of patient resistance toward admission to nursing homes.

Project No. 12

Methodology to identify non-medical factors affecting length of stay in active treatment hospitals.

Project No. 13

Effect of patient attitude toward care received on demands upon nursing time.

Health Facilities DesignIntramural

- Study of air currents in the immediate environment of surgical operating procedures using Schlieren technique and cine photography.
- Study of total heat and electrical energy demand requirements for specific hospital departments.
- Design criteria study of University of British Columbia Health Sciences Centre.
- Study of health facility construction cost data reports.

Extramural

- Study of air conditioning and filtration for surgical suites and evaluation of air recirculation and heat exchanger systems.

13.2.4.1.3

MEDICAL SERVICES BRANCH

Medical Services Projects

— Title: Amoebiasis Research

Date: Began; January, 1966; Continuing

Objectives and Findings:

1. To find why amoeba invade tissues in some cases and do not invade but live as commensals in others. Very little of note found to date.
2. To gain knowledge of serology of amoebiasis. Knowledge of complement fixation and haemagglutinin reactions in various stages of chronicity obtained.
3. To obtain, if possible, knowledge of the means to eradicate amoebiasis. Field experience has led to an expression of opinions.

Specific Objective: Indian health improvement.

Northern Medical Research Unit

— Title: Comparative Study of Alcohol Metabolism in Indians, Eskimos and Whites.

Date: Began; Summer, 1966 - Fall, 1967.

Objectives and Findings:

Clinical observations suggested a slower metabolic rate of imbibed alcohol in Northern Indians and Eskimos. The objective was to prove or disprove this. Using intravenous infusions of 10% alcohol solution as the best controllable means of administration and breathalyzer monitoring we have found to date in 24 Indians, 22 Eskimos and 10 Whites with comparable past history of alcohol consumption a significant difference in the metabolic rates of the Whites vs. Northern Indians and Eskimos.

The latter show only approximately 60% of the metabolic rate of the White controls. The number of White controls is, however, insufficient so far as a control group but we hope to be able to get enough White volunteers comparable in sex, age and past alcohol consumption to provide a valid control sample.

Specific Objective: Morbidity and mortality related to acute and chronic effect of alcohol consumption are of prime importance in our native population. If differences in metabolism of alcohol should be demonstrated for Northern Indians and Eskimos this would have important implications particularly in the field of Public Health Education.

— Title: Nutrition Survey of Five Canadian Eskimo Groups

Date: Began; Spring, 1965 - Winter, 1967/68.

Objectives and Findings:

To relate general state of health as well as a number of anthropometric, biochemical and nutritional parameter to different nutritional backgrounds as represented by the five population groups chosen.

The copious data collected have not yet been compiled and processed except for compilation of background data. These showed the Frobisher Bay Eskimos having suffered the most drastic reduction in protein-rich native food. It is in this connection noteworthy that the hemoglobin values were generally lower in Frobisher than in the other groups examined and the only obvious cases of rickets were seen there. Ascorbic acid levels were generally within normal limits, as were all other vitamin determinations. Serum cholesterol levels appeared relatively low in all groups. Full assessment will only be possible after all data have been properly processed which we hope can be arranged after this fall and winter.

Specific Objective: We have suggestive evidence of the close relationship of nutritional factors to resistance to infections, anemia, etc. in a number of native population groups. Results of this survey may be used to give advice for supplementary medication or supplementary food distribution (school feeding program) and Public Health Education.

Special Committee

Title: (a) Glycosuria and Diabetes in Eskimos
(b) Oral and Intravenous Glucose Tolerance Studies in Eskimos.

Date: Began; 1964 - Summer, 1967.

Objectives and Findings:

A relatively high incidence of glycosuria contrasting to an extremely low incidence of Diabetes Mellitus was demonstrated. Glycosuria often runs in families, irrespective of diet, and is much more often found in males than females in Greenland and the Canadian Arctic, while this peculiar sex difference gradually disappears in more Western Eskimo groups. Systematic testing with oral and intravenous administered Glucose loads demonstrated:

- (a) a high percentage of "pseudo-diabetic" curves after oral testing with a higher incidence of abnormal responses in hospitalized than ambulant Eskimos, and a markedly lower rate of abnormal responses in males tested in the field;
- (b) normal test results after intravenous glucose administration on practically all (96%) Eskimos having shown abnormal oral glucose tolerance test results.

A second study involving measurement of plasma insulin levels and plasma glucogen levels is planned to test our hypothesis that a relative lack of intestinal mucosal endocrine stimulation of insulin release after enteral glucose absorption may be at fault rather than primary islet cell failure.

Specific Objective: Cases of Eskimos labelled as and treated for "Diabetes Mellitus" on account of incidental finding of glycosuria and abnormal oral glucose tolerance tests are becoming more frequent from year to year. This diagnosis has very great consequences for family groups and the individual Eskimo concerned and great trouble and costs for our Northern Health Services. Clarification of individual cases as well as the scientific problems involved are in our practical interest.

Current Projects

Investigation of the effect of changing patterns of Eskimos diet, the resulting effect on Eskimo metabolic processes, metabolic diseases and general health.

(Diabetes, previously unknown among Eskimos, is now appearing).

Investigation of the metabolism of alcohol in Eskimos (which, it has been demonstrated, differs from that in other people) and the use of ethyl alcohol in treating cases of methyl alcohol poisoning.

Investigation of the specificity of antigens obtained from various animals, e.g. reindeer, elk, and sheep infested with *Taeniae* echinococci with a view to developing a reliable test to detect hydatid disease in humans. Recently clinical tests were carried out at Inuvik under Medical Services auspices by units of the Health Branch of the department.

Clinical trials of attenuated measles vaccines and meningococcal vaccine directed by various investigators.

A continuing study of amoebiasis in Northwestern Saskatchewan.

The department has supplemented the staff and financial resources of the Saskatchewan Zone to enable a parasitologist with university affiliation to act as a consultant. The arrangement covers field visits, consultative advice in planning health and treatment measures and includes laboratory investigation of clinical material. More specifically answers are being sought to such questions as:

- a) What facilitates the spread of *amoeba histolytica* in this area?
- b) Why does the ability of the amoeba to invade human tissues vary in different individuals?
- c) What influence is exerted by differing patterns of intestinal flora? The serology of amoebiasis as distinct from frank dysentery is being studied and comparisons made with findings in Mexico and Africa.

Other incidental "research"

In order to evaluate the effectiveness of the health activities being carried on by the Branch amongst Indians and Eskimos, one headquarters advisory medical officer has undertaken studies of mortality and morbidity data collected and supplied by the Indian

Affairs Branch. As a result he has been able to demonstrate three distinct and differing patterns of vital statistics shown by Indians in Eastern, Central and Western Canada and produce Life Tables for Indians and Eskimos which show that, with the exception of the years of earlier life, Indian expectation of life does not significantly differ from normal Canadian expectancy but that Eskimos of all ages have a significantly lower expectation of life. It was further demonstrated that Indians availing themselves of available services properly suffered an infant mortality rate not markedly in excess of the national rate but also that some 20 - 25% of Indian mothers were not availing themselves properly of the services offered and this segment was contributing half the total Indian infant mortality. The leading causes of Indian and Eskimo mortality have been identified and specific problems more clearly documented. As a result, certain changes in emphasis were made in the health program and Indian infant mortality reduced by 50%, Eskimo mortality substantially reduced. This Branch has collaborated with both the Department of Indian Affairs and Northern Development and the Dominion Bureau of Statistics and partly as a result of reports, published annually by the department under the title "Indian Vital Statistics", the Department of Indian Affairs and Northern Development has recently engaged the services of a professional demographer and established a special unit for statistical and demographic research while the Dominion Bureau of Statistics are collaborating with the Indian Affairs Branch in trying to reconcile their conflicting data on Indians, the problem being that in the provinces, the source of D.B.S. statistics, "Indian" is an ethnic classification and, to the Indian Affairs Branch, a legal definition excluding many classified as "Indian" by provincial authorities. This might conceivably be classified as "research" influencing the activities of this and other government departments. In 1967, a special study of the factors influencing Indian infant mortality was published by the department under the title, "Survey of Maternal and Child Health of Canadian Registered Indians". Several papers have been published on specific findings

in various professional journals. A recent study has documented the influence exerted on British Columbia vital statistics by inclusion of the Indian population, comprising less than 3% of the total population but influencing the provincial rates out of all proportion to their numbers. Other studies have demonstrated consistent but differing patterns of rejection of immigrants on medical grounds from Britain, Europe and Asia and compared the relative effectiveness of various methods of control of the health of immigrants. He has also studied the patterns of morbidity seen in the Public Service Health Units. These studies were undertaken for evaluation and guidance.

13.2.4.1.4

FOOD AND DRUG DIRECTORATE

Research LaboratoriesFood Division

- The application of glycoprotein characteristics to the identification of plant and animal tissues used in meat preparations.
- The identification and quantitation of the materials contributing to the protein content of meat products.
- The chemical composition of fruit juices and the development of indices for the identification and measurement of fruit juice content.
- Development of a scheme of analysis for emulsifiers
- Methods for polynuclear hydrocarbons in smoke flavoured foods
- A general screening method with confirmation procedures for determining pesticide residues in samples of plant or animal origin
- A study of detectors for pesticides resolved by gas liquid chromatographic techniques.
- Morphological and physiological responses of selected fungi to various pesticides.
- Organophosphorus Pesticides: Methods of determination, metabolism and effect of irradiation
- Metabolism of organochlorine pesticides and the development of methods for determining residues of these compounds.
- The biological assay of toxic residues in food materials
- A study of the effect of organophosphorus pesticides on enzyme systems

- A scheme of analyses for the rapid determination of trace quantities of metals in foods.
- The characterization of toxic compounds of fungal origin, and their analysis in foodstuffs.
- Chemical indices for detection of filth and insects in foods.
- Nitrosamines and other carcinogenic nitroso compounds in foods.
- Metabolism of fungicides in foodstuffs.
- Studies on flavouring agents and flavour enhancers: II. Common flavours containing a methylenedioxy group
- Biochemical reactions of fungal toxins.
- Methods of analysis for food colours
- A general scheme for the detection and estimation of residual solvents in foods and food ingredients by gas liquid chromatography
- Detection and estimation of brominated oils in fruit drinks.
- Detection of adulteration and substitution in fats and oils
 - a. olive oil
 - b. butter fat
 - c. margarines and shortenings
- Esterases in relation to their interaction with pesticides commonly applied to foodstuffs.
- The chemical composition of jams, jellies, marmalades, preserves and the development of indices for the identification and measurement of fruit content.

Microbiology Division

- Development of modified toxins or virulence by irradiated bacteria.
- Identification of C. botulinum cultures by serological procedures
- The determination of staphylococcus enterotoxin A.
- The isolation and characterization of an emetic principle from malted milk powder.
- Changes in DNA in irradiation-resistant E. coli
- A rationale for the requirement of uracil and arginine by a radiation resistant organism.
- Enzymes involved in the synthesis of RNA and protein in normal and radiation-resistant E. coli
- A comparative cytological study of normal and irradiation resistant bacterial mutants using the electron microscope.
- Improved specificity of procedures for detection of C. botulinum using fluorescent labelled antibodies.
- Enzymological studies in relation to Salmonella isolation procedures.
- The interaction of sodium chloride, sodium nitrite and pH on destruction of spores of Clostridium botulinum during thermal processing and on outgrowth of spores after thermal processing.
- The Effect of Sodium Nitrite, Sodium Chloride, Spore Numbers, and Heat Processing on Toxinogenesis by Clostridium botulinum in canned Luncheon Meat.
- The cause of food poisoning induced by Clostridium perfringens

- The determination of the ability of food-borne fungi to produce aflatoxins ochratoxin A and other toxic metabolites.
- Formation and alterations of botulinal toxins.
- Collaborative assay, various methods for food microbiology, including specific tests for pathogens in foods.
- Serological detection of staphylococcal enterotoxins. Collaborative assay of U.S.F.D.A. procedure.

Nutrition Research Division

- Nutritional effects of the nitrate-nitrite content of foods.
- Vitamin A and its role in the body
- Nonsaponifiable constituents of human tissue
- Fatty acids and phospholipids
- Effect of oral contraceptives on pyridoxine metabolism
- Chemical and biological studies of vitamin D
- Metabolic studies on ascorbic acid
- Prediction of stability of vitamin products
- Calcium and phosphorus metabolism
- Protein-nutrient interrelationships
- Evaluation of proteins
- Drug-nutrient interactions in microorganisms and animals.

Special Committee

- A collaborative investigation of procedures used in amino acid analysis of biological fluids and protein hydrolyzates.

- Availability of zinc in oysters

Pharmaceutical Chemistry Division

- Application of Acid-Dye Technique to Drug Analysis

- Content Uniformity of Pharmaceutical Dosage Forms - Tablets and Capsules

- Determination of Propoxyphene in Admixtures with A.S.A. or A.P.C.

- Quantitative Determination of Nitroglycerine Preparations by Polarography

- Dissolution Rate of Hydrochlorothiazide

- Infrared and NMR Spectra of Xanthine Salts and Derivatives

- Development of Dissolution Apparatus Using a Sintered Glass Filter Funnel

- Protonation Site in Lidocaine by NMR Conformational Aspects in Lidocaine and its Salts

- The Constituents of Boldo Leaves (Peumus boldus Molina)

- The Analysis of Drugs Related to Choline in Pharmaceutical Preparations

- The Nature of the Toxic Principle of Clitocybe dealbata

- The Chemistry of Porphyrone

- Analysis of Natural Products and Pharmaceutical Preparations Containing Veratrum

- Determination of Laudanine in Opium
- Characterization of a Psilocybe Mushroom
- The Effect of Gibberellic Acid on Two Species of Ipomoea
- Fatty Acids Composition in Maturing Seeds of Two Species of Ipomoea
- Use of Plant Tissue Cultures in Pharmacognosy
- Physico-chemical Investigations on Natural Products Containing Anthrol Glycoside Cathartics
- Analysis of Medicinal Substances by "Reaction Gas Chromatography"
- Physico-chemical Investigations on Vetiver Oils
- Dissolution rate studies
- Infrared spectroscopic studies on drugs and drug interactions
- NMR studies of drugs (and related chemicals), drug interactions and drug analysis.
- Detection of impurities in bulk drugs
- The estimation of drugs and their metabolites in biological fluids
- Qualitative and quantitative methods for analysis of antibiotics
- Toxic plants and related substances
- Analysis of pharmaceutical preparations containing natural products
- Pharmacognosy of drug plants used in pharmaceutical preparations.

Special Committee

- Examination of narcotics, controlled drugs and other drugs subject to abuse.
- Analytical criteria of pharmaceutical quality control.
- Qualitative and quantitative methods for analysis of pharmaceutical dosage forms.
- Stability of drugs and pharmaceuticals
- The development of analytical procedures for steroids
- Recognition of Origin of Marihuana via Examination of its Essential Oil
- Chemical Detection and Differentiation of Natural and Semi-Synthetic Penicillins
- Chemical Methods of Identification and Assay of Vancomycin
- Quality Control and Purity of Bulk Pharmaceuticals Imported into Canada.
- Stability of Pyrvinium Pamoate
- Thin-Layer Chromatography of 1,4-Benzodiazepines, their Intermediates, and Decomposition Products
- Determination of Aromatic Amines Containing a Sulfonamide and Other Substituents via Diazotization
- Stability of Sulfonylurea Drugs (Tolbutamide and Chlorpropamide)
- Gas Chromatographic Procedures for the Identification and Assay of APC Combinations.

- Potentiation of the Effects of Alcohol by Coprinus Mushrooms
- Determination of Trifluoperazine and its Metabolites in Urine and Blood.
- Kinetic Analysis of Drugs in the Phenothiazine Series
- Analysis of Pharmaceutical Preparations Containing Natural Products. I. Analysis of Products Containing Atropa belladonna and Cephaelis ipecacuanha, respectively

Pharmacology Division

- The relationship between molecular structure and biological activity of steroid hormones
- Immunoassay of human gonadotropins
- Labelled progestational steroids and their mechanism of action
- I. Synthesis of 4-¹⁴C-17 α -Ethinyl-19-nortestosterone
- Influence of the limbic system over pituitary-adrenal function
- I: Effect of chlordiazepoxide
- II: Effect of barbiturates
- Blood and cholinesterase levels and drug activity
- Physiological availability of drugs in various oral dosage forms
- Modifying factors in chemical carcinogenesis. Age and carcinogenesis.
- Carcinogenicity of placental and milk transferred aflatoxin metabolites.

Special Committee

- Toxicity and carcinogenicity of food colours
 - a. Biochemical studies with blue VMS
 - b. Carcinogenicity of triphenyl methane dyes
- Teratogenic and toxic effects of food additives and drugs
- Interactions between alcohol and other drugs
- Cobalt Metabolism
 - a. Biochemical aspects
 - b. Studies on cobalt toxicity
 - c. Electron microscopic changes induced by cobalt
- The Determination of Estrogenic Hormones by Gas Chromatography
- The Mechanism and Site of Action of the Oral Contraceptives
- Mechanism of Action of Thyroid Hormones
- Drug Receptors for Sympathomimetic Amines in Vascular Smooth Muscle
- The Effect of CNS Drugs Administered in Pregnancy on Behaviour of Offspring
- Animal Models for Testing Drugs Affecting the Central Nervous System
- Effects of Drugs on the Catecholamine Active Uptake Mechanism in the Heart
- Effects of Diet on drug response
- The mechanism of action and metabolic fate of DDA, the principal urinary metabolite of DDT

- The metabolism of drugs by the human placenta
- Conjugation and detoxification of steroids
- Investigations relating to incompatibility between Hexamethylene-tetramine (Methenamine) and various drugs
- Drug induced chromosomal aberrations
- Inhibition of uricase in vivo
- Perinatal pharmacology
- Evaluation of behavioural tests with respect to their specificity to drug effects in animals and their predictive value to drug effects in man
- Effect of nicotinic acid and its derivatives and analogues on pituitary-adrenal activity in animals and man
- Anti-folic activity of drugs, with particular attention to pyridium and pteridine diuretics.
- The role of N-acetyl aspartic acid in the central nervous system
- Interaction between drugs: Effect of administration of β -blocking agents during blockade by α -adrenergic blocking agents
- Pharmacological and behavioural effects of nutmeg
- Evaluation of Thyroid Function in Toxicity Testing
- Toxic Factors in Highly Processed Foods
- Metabolism of Methenamine (Hexamethylenetetramine) (Hexamine)

Special Committee

- Mutagenic Effects of Drugs and Chemicals
- The Effect of Dosage Form and Route of Administration on the Absorption and Excretion of Acetylsalicylic Acid in Man

13.2.4.1.5

Intramural Research ProjectsResearch Projects Currently in ProgressResearch and Statistics Directorate by DivisionBiostatistics Division

1. Canadian Study of Smoking
2. Chronic Bronchitis among D.V.A. Pensioners
3. Death Rates for Diseases of Interest in Relation to Smoking.
4. Accident Statistics
5. Histoplasmosis Study
6. National Cancer Register
7. Incidents of Salmonella Infections
8. Analysis of Virus Isolations
9. Analysis of Virus Vaccines
10. Surveillance System for Congenital Anomalies
11. National Hospital Morbidity Reports
12. Morbidity Trends for Heart Disease
13. Morbidity Trends for Cancer by Site
14. Birth Rate Trends and Implications for Hospital Bed Requirements.
15. Analysis of Trends in Hospital Morbidity
16. Morbidity Statistics for T.H.I.S.
17. Morbidity for Y.H.I.S.
18. Hospital Insurance Statistics for Minister's Report
19. Preliminary Report on Hospital Insurance Statistics
20. Preparation of Lists of Hospitals, Preparation of Special Tabulations of Hospital Statistics and Editing of Hospital Returns
21. Introduction of Revised Reporting System for Hospitals for 1968 or 1969.
22. A Review of Radiological Services in large Hospitals
23. Analysis of Trends in Out-patient Services in large Hospitals
24. An Analysis of Surgical Operations in Canada, 1961-1965
25. Revision of Canadian Hospital Morbidity List and Ten Standard Morbidity Tables
26. Inventory of Hospital Research

Special Committee

27. Nursing Function Studies in
 - (a) St. John's General Hospital
 - (b) St. John's Mental and Nervous Disease Hospital
 - (c) Regina Grey Nun's Hospital
 - (d) Sioux Lookout General Hospital
 - (e) Saskatoon General Hospital
 - (f) Whitehorse Hospital
 - (g) University Hospital, Saskatoon
28. A Comparison of Nursing Functions in two large Hospitals
29. Annual Report of Poison Control Centres
30. Analysis of Adverse Drug Reaction Program
31. A Study of Eskimo Nutrition
32. A Study of Child Nutrition in Nova Scotia
33. Survey of Normal Hemoglobin Values
34. Analysis of Immigration and Emigration of Doctors
35. Analysis of Data from C.M.A. Physicians Survey
36. The Effect for Demand of Dental Services
37. The Medical Effects of Fluoridation
38. Analysis of the Dental Health Index
39. Medical Factors in Pilots Involved in Aircraft Accidents
40. Household Sickness Survey in Four Communities
41. Health Screening Program in Four Communities
42. Respiratory Diseases in Asbestos Mining
43. The Health Effects of Air Pollution
44. Nursing Functions of Occupational Health Nurses
45. Analysis of Income of GIS Recipients
46. Analysis of CAP Statistics
47. Statistical Program for GPP
48. Task Force on Family Allowances Data Linkage
49. Radioactive Materials in Powdered Milk
50. Radioisotope Services in Hospitals
51. The Carcinogenic Properties of Thorotrast used in Radiography
52. Radiation Hazards Among Exposed Workers
53. Radioactive Materials in Teenage Diets
54. Chromosomes in Blood Samples

55. Research Methodology for R.P.D. Reports

Health Research Division

1. Medical Care Cost Estimates - (Preliminary Estimates of Program Costs of Physicians' Services under a Comprehensive Medical Care Program) Canada and the Provinces 1964-1971.
2. Medical Care Reporting Forms
3. The Economic Implications of Medicare
4. Cost Estimates for Non-physician Services
5. Statistical Program for Medical Care Insurance
6. Earnings of Physicians 1957 to 1965
7. Earnings of Physicians in 1966
8. Physicians' Earnings by Nature of Practice
9. Supply and Distribution of Physicians in Canada
10. Voluntary Medical Insurance in Canada 1955 to 1966
11. Analysis of Provincial Fee Schedules
12. Patient and Doctor Profiles under Medical Services, Alberta
13. Health Care Prices in Canada
14. Health Care Prices in Canada, United States and United Kingdom
15. Health Care Programs for Public Assistance Recipients 1959-1968
16. Statistical Reporting Program for Medical Care under CAP
17. Family Health Expenditures in Canada
18. Health Expenditures in the National Accounts
19. Earnings of Dentists in Canada 1959-1965
20. Health Resources Fund Statistics
21. Hospital Insurance Cost Forecasts
22. Analysis of Hospital Insurance Statistics for Minister's Annual Report
23. Personal Health Care Expenditures in Canada 1961-1965
24. Personal Health Care Expenditures in Selected Countries
25. Inventory of Socio-Economic Research in Health Care
26. Hospital Expenditures in Canada
27. Explanation of Trends in Hospital Care Costs in Recent Years
28. Trends in Drug Costs

Special Committee

29. Provincial Health Services by Province
30. Provincial Health Services by Program
31. National Health Services, Statutory and Voluntary
32. Health Care for the Aged
33. Utilization of Rehabilitation Grants
34. Organized Home Care in Canada
35. Health Legislation in Canada
36. Studies concerning the Medical Care Plans in British Columbia, Alberta, Saskatchewan, Newfoundland, and Ontario.

Social Security Research Division

1. Government Expenditures on Health and Social Welfare, Canada, 1927 to 1966
2. Private Pension Plan Legislation
3. Social Security Expenditures, 1967
4. Social Security Expenditures in Five Countries
5. Social Security Expenditures by Province
6. Quarterly Statistical Bulletin
7. Analysis of Trends and Adequacy of Social Security Measures in Canada
8. Family Allowances in Selected Countries
9. Cash Sickness Benefits in Selected Countries
10. Disability Benefits in Selected Countries
11. Completion of Annual ILO Questionnaire
12. Completion of Annual ISSA Questionnaires
13. Continuous Work History Sample for CPP
14. Pilot Project on CPP Benefit Statistics
15. Analysis of CPP Contribution and Earnings Statistics
16. Evaluation of the CPP - Contributions, Coverage, Benefits, Adequacy and Economic Implications
17. Family Allowances in Canada
18. Disability Allowance Statistics
19. Analysis of GIS Statistics
20. Evaluation of GIS Program - Coverage, Income Benefits, Adequacy and Economic Implications
21. Analysis of the Social Security Implications of the Carter Commission Report

Welfare Research Division

1. Child Welfare Statistics
2. Canada Assistance Plan Statistics
3. Social Work School Enrollment Statistics
4. Developments in Health and Social Welfare Related to Human Rights
5. Report on Development of Economic, Social and Cultural Rights, 1963 to 1966, for the United Nations
6. Report on Changes in General Assistance for 1966
7. Appraisal of Welfare Research Grants
8. Survey of Welfare Positions and Manpower
9. Inventory of Welfare Research
10. Unusual and Imaginative Programs Involving Older People

Health Research Division

The following provides a summary view of the principal fields of socio-economic research in the Health Research Division.

The Medical Care Section is concerned with the total activity area of personal health care, i.e., health services concerned with diagnosis and treatment of disease, with particular reference to physicians' services. Research is undertaken into the economic and social aspects of the public and private arrangements for personal health care services in Canada and abroad, including the following:

- (i) Voluntary health insurance programs - complex research on population coverage, benefits provided and not provided, premium structures, payments to suppliers of service, cost experience and cost control techniques, utilization experience, administration, emerging trends, and role in the national economy.
- (ii) Public programs of health care for specific groups, e.g. public assistance recipients - complex research on existing programs as above, with additional emphasis on program development, application of new concepts, methodology for statistical development and reports, cost estimates and forecasts, and advice on policy formation.

- (iii) Public medical care programs - complex research on existing programs as above, with additional emphasis on program development including evaluation of different approaches application of new concepts, methodology for statistical assessment, cost estimates and forecasts, and advice on policy formation.
- (iv) Patterns of organization of personal health care services - complex analysis of structure and functions of health centres and clinics, group and solo medical practice, paramedical services, availability and quality of health care in relation to health needs of the population.
- (v) Income of Physicians and Fee Schedules - multi-variate analysis of variables affecting physicians' incomes, fee schedules and methods of remuneration, trends in income based on taxation statistics and implications for cost estimates and forecasts.
- (vi) Supply of Medical Manpower - analysis of trends in supply and distribution of medical manpower in relation to demand and utilization, nature and output of training facilities specialization versus general practice, forecasts of future supply and future requirements.
- (vii) Foreign Health Care Programs - complex research on foreign health insurance programs, patterns of organization, cost experience and health resources, with particular reference to problems and approaches of significance to Canadian developments.

The Hospital Care Section is concerned with the total activity area of hospital care. It undertakes research into the economic and social aspects of hospital care costs, services and resources in Canada and abroad. Particular mention can be made of the following:

- (i) Cost of hospital care - multi-variate analysis of the factors involved in hospital care costs, studies of particular cost elements such as salaries, dietary, or nursing schools, input-output analysis of the hospital industry, cost trends and cost control techniques, and annual forecast of cost of hospital services in each province and nationally as required under the Hospital Insurance and Diagnostic Services Act.

- (ii) Hospital facilities - multi-variate analysis of the demand for hospital care, determination of requirements for hospital facilities, participation in specific surveys of hospital bed needs, cost analysis of hospital construction assessment of methods of financing capital development.
- (iii) Utilization of hospital services - analysis of trends and patterns of utilization, lengths of stay and levels of care, evaluation of morbidity data, usage of particular services, utilization control techniques.
- (iv) Hospital personnel - analysis of trends in supply and distribution of hospital personnel, nature and output of training facilities, forecasts of future supply and requirements.
- (v) Patterns of hospital organization - sociological studies of hospital systems and regional organization of services, analysis of roles and functions of hospital personnel, study of social and cultural factors affecting utilization of services, and affecting the recruitment and training of personnel.
- (vi) Foreign hospital care programs - research on coverage, benefits, methods of financing, hospital organization structure, cost experience and control techniques, with particular reference to problems and approaches of significance to Canadian developments.
- (vii) Annual report of hospital insurance program - plan and prepare the annual statistical analysis of the federal-provincial hospital insurance program.
- (viii) Related institutional care - research on long-term care, nursing homes and related facilities for special care, including cost analysis, utilization experience, facility and personnel requirements, coverage, benefits and methods of financing, patterns of organization, and program development.

The Public Health Section is concerned with the total activity area of public health services. Among the areas of activity are the following:

- (i) Rehabilitation services including medical, vocational and special education services for handicapped children and adults or other special groups and rehabilitation programs for persons with specific disabilities; studies of legislation, organization, expenditures and personnel.
- (ii) Disability benefit programs in relation to health and rehabilitation services in Canada and other countries.
- (iii) Socio-economic studies of chronic disease programs and voluntary health agencies, health services for the aged, nursing home services and organized home care programs.
- (iv) Research and survey projects related to mental health services, cancer services, preventive public health services and health services generally.
- (v) Research on federal, provincial and local health legislation and health organizations, including administrative and financial relationships.
- (vi) Analysis and interpretation of data on utilization, services and resources arising from the national health grants program and related health programs.

The Health Expenditures and Resources Section deals with health economics research into personal health care expenditures, health resources and the drug industry. It also maintains a national inventory of socio-economic research projects related to health care. The main functions may be summarized as follows:

- (i) Studies of the drug industry in Canada including cost-price analyses of drugs, development of statistical reporting systems on drug costs, and research into drug benefit programs.
- (ii) Continuing studies of health expenditures in Canada and other countries.
- (iii) Studies of health resources, with particular reference to training facilities in the health professions and the Health Resources Fund.

- (iv) Maintenance of an inventory of socio-economic research in the health field.
- (v) Participation in international health economic studies.
- (vi) Special projects in health economics such as cost-benefit analyses.

13.2.4.1.6

SPECIAL PROGRAMMES BRANCH

Welfare Projects, IntramuralEmergency Welfare Servicesa) 1962 - 67

- Publication of EWS operational manuals, (English and French)
- Working Group on "Emergency Welfare Services in Peacetime Disasters".
- Working Group on "Operational Requirements at a Regional Emergency Government Headquarters".
- Working Group on "Contents of a Welfare Centre Kit".
- Preparation of a Departmental Readiness Plan (Welfare Branch).
- Preparation of prototype EWS provincial and municipal plans.
- Implementation and continuation of the EWS stockpiling program (operational forms, systems and equipment).
- Assistance to provinces in the area of continuity of welfare programs in emergency.
- SIMPAC report.

b) Most Significant Completed Projects

- Preparation of a Departmental Readiness Plan (Welfare Branch).
- Publication of EWS operational manuals.
- Development of an operational Welfare Centre Kit.

The completion of these three projects facilitates and helps to ensure a potential operational capability at the three levels of government. They also relate specifically to the assigned responsibilities of the Division and to its program objectives

13.2.4.2

Inventory of Projects Conducted Extramurally and Supported by the
Department of National Health and Welfare for Fiscal Years 1962-67.

13.2.4.2.1

(1) Public Health Research Grants Supported 1962-67, listed by
Province.

13.2.4.2.2

(2) Smoking and Health Studies Supported 1964 to date.

13.2.4.2.3

(3) Welfare Research Projects Supported 1962-67.

Welfare Demonstration Projects Supported Since April, 1966.

13.2.4.2.4

(4) Fitness and Amateur Sports Research Projects Supported
1962-67/68.

13.2.4.2.1

Public Health Research Grants Projects Supported Fiscal Years 1962
to 1967 Included by Province

Newfoundland

Factors involved in Tissue Response to Radiation in a Fluorspar
Mine

(Dr. Leonard Miller)

The Haemodynamic Study of Acute Myocardial Infarction and the
Mechanism of Death

(Dr. G.B. Peckham)

Study of Morbidity in General Practice

(Dr. John Ross)

Psychological Deficit, Hyperarousal, Mediating Processes, and
Delusion Formation in Psychiatric Patients

(David S. Hart)

An Investigation of the Qualitative Differences in Intellectual
Performance of Bright, Average, Dull and Defective Subjects of the
Same Mental Age

(Arthur M. Sullivan)

Investigation and Retraining of an Individual Following Twenty
Years of Isolation

(Arthur M. Sullivan)

Hypertension in Newfoundland - Its incidence in Selected Communi-
ties and a Study of Etiological Factors

(Ian Rusted)

Prince Edward Island

Incidence and Significance of Paracolon Bacilli in Water Supplies.
The Determination of Insecticide Residues in Milk (Chemistry
Department, St. Dunstan's University)

(Dr. John Craig)

Hospital Utilization

(J.M. Wanklin)

Distribution of Psychiatric Disorders

(E.N. Beck)

The Determination of Organo-Phosphorus Insecticides in Plants

(J. Regis Duffy)

Nova Scotia

Study of some factors influencing the Quality and Quantity of Medical and Hospital Care that may be Relevant to the Planning and Administration of Health Facilities and Services

(Dr. G.H. Hatcher)

Congenital Dwarfism Related to Placental Insufficiency

(Dr. Carl Tupper & Wm. Cochrane)

Studies of the Anemia of Debilitating Disease including Rheumatoid Arthritis

(H.C. Read)

The Study of Infectious Hepatitis in the Atlantic Provinces with a View to the Isolation and Characterization of the Causative Agent by Tissue Culture Serology Immunodiffusion and Electron Microscopy

(C.E. Van Rooyen)

A Study of the Administration and Program of the Halifax City Health Department.

Assessment of the Adequacy of Control of Diabetics in Receipt of Free Drugs Supplied by the Assistance to Diabetics Program of the Department of Health, Province of Nova Scotia

(D.J. Tinning)

Special Committee

Investigation of Significant Bacilluria in Pregnant Women,
Dalhousie University

(A.J. MacLeod)

Fecal Flora in the Neonate - A Bacteriological and Clinical Study
(Dr. V.W. Krause & Dr. W.A. Cochrane)

Studies in the Application of the Fluorescent Antibody Technique
to the Early Diagnosis of Respiratory Virus Infections, Dalhousie
University

(W.G. Henderson)

Disinfection and Retention of Combined Sewage, Nova Scotia
Technical College

(D.H. Waller)

To Attempt to Determine the Medical Needs of the Population of
Nova Scotia on the Basis of Distribution of Physicians, Dalhousie
Public Health Clinic

(C.J.W. Beckwith)

Studies on the Etiology and Pathogenesis of Atherosclerosis with
Special Reference to Platelet and Serum Lipid Changes, Victoria
General Hospital, Halifax

(S.J. Shane)

Determination of Tuberculin Reversion Rates in Tuberculin Converters
and First Positive Tuberculin Reactors and the Incidence of Clinical
Tuberculosis in Each Group, Dalhousie Public Health Clinic

(C.J.W. Beckwith)

Pharmacological Effects upon Aqueous Hydrodynamics in Normal and
Glaucomatous Eyes, Glaucoma Clinic, the Victoria General Hospital

(Dr. Claude Fraser Keays)

Epidemiological Study of Glucose 6 Phosphate Dehydrogenase
Deficiency in Nova Scotia Negroes

(G. Ross Langley)

Dysgammaglobulinemia in Children with a History of Recurrent
Infections

(Margaret S. Dewolfe)

Investigation of the Oncogenic Effects of Radiation induced in
Patients previously subjected to repeated Fluoroscopic Examinations
in the Treatment of Pulmonary Tuberculosis

(Ian MacKenzie)

An Investigation of Factors influencing community co-operation in
developing a Program of Balanced Hospital and Alternate Health
Care

(Sister Maria)

To Study the Importance of Airflow in Lobar and Segmental Bronchi
in Chest Disease

(P.L. Landrigan)

The Determinants of Figure Rotation in Brain Damaged and Psychotic
Patients

(E.G. Nichols)

Studies of Tryptophane, Pyridoxine and Gamma Amino Butyric Acid in
Metabolism in Mental Retardation and/or Convulsive Disorders in
Infants and Children

(William Cochrane)

Methods for Extinguishing or Desensitizing the Anxiety Response in
Humans

(Horace D. Beach)

The Response of Head and Neck Malignancies by Continuous Intra-
Arterial Infusion of Methotrexate

(Prof. Ian MacKenzie)

A Search for Better Immunization against Smallpox than by use of
Calf Lymph

(C.E. Van Rooyen)

Practical Aspects of Sex Hormone Metabolism in men with Myocardial
Infarction

(William Inglis Morse)

Congenital Dwarfism Related to Placental Insufficiency

(Carl Tupper, Wm. Cochrane)

An Investigation of Short-Term Memory and Neural Excitability with
Special Reference to Elderly, Memory Disorders Psychiatric Patients

(W.K. Caird)

Hearing Screening Test for Infants

(Adam J. Sortini)

A Study of the Physiological Derangements of the Cardiovascular
and Respiratory Systems, in Patients Suffering Thoracic Trauma

(C.E. Kinley)

Investigation of Diagnostic and Treatment Methods for School
Children with Learning Disabilities

(Ruth McDougall)

Biochemical Abnormalities in Children Associated with Childhood
Schizophrenia and Mental Retardation with Special Reference to
Tryptophan, Histidine, and Epinephrine Metabolism

(William Cochrane)

Punishment as a Means of Modifying Human Behavior

(Horace D. Beach)

Epidemiological Studies of Mental Retardation Associated with
Cytomegalo Virus Disease affecting Children in the Atlantic Provinces

(Prof. C.E. Van Rooyen)

Epidemiological Study of Fractured Hips

(Dr. Peter C. Gordon)

Studies of Carbohydrate Metabolism and Growth Hormone Response in
Intra-Uterine Growth Retardation

(W.A. Cochrane)

(A) The Study of (1) Positive TBN Reactors and (2) TBN Converters
to Determine Reversion Rates

(B) To Determine the Effect of Isoniazid in Each of these Groups
(1 and 2) in Relation to TBN Reversion

(C) To Study the Incidence of Atypical Mycobacteria such as the
Battey in Doubtful and Positive TBN Reactors

(C.J.W. Beckwith)

The Prevention of Permanent Neurological Sequellae of Perinatal
Anoxia by Treatment of Acidosis at Birth

(Kenneth Edward Scott)

A Longitudinal Study to Determine the Prevalence and Incidence of
the more common Dental Diseases in School Children (Caries,
Periodontal Disease, and Malocclusions) and to Evaluate the
Existing Provincial Dental Program

(Dr. W.C. King)

The Application of a New and Rapid Method of Measuring Urinary
Estriol Excretion and its Value as a Test of Placental Dysfunction

(Dr. Clair MacLeod)

Visual Causes of Birth Disabilities

(Dr. Van Rooyen)

Porphyria in Nova Scotia

(Dr. Ross Langley)

Special Committee

Experimental Alteration of Learning and Memory by Use of Psychotropic Drugs

(William K. Caird)

The Development of Socially Désirable Behaviours and the Inhibition of Anti-Social Behaviour in Children through Modeling Procedures

(Barbara S. Clark)

To Assess the Incidence and Clinical Significance of Lung Disease Due to Aspergillus Fungi

(Paul L. Landrigan)

New Brunswick

A Study of the Nutritional Value of N.B. Grown Farm Products

Estimation of Ragweed Pollen from Selected Centres in N.B.

A Survey of the Fluoride Content of New Brunswick Drinking Water

Future Nursing Practise in New Brunswick

(Dr. C.W. Argue)

Research Assistance to the University of N.B. (Bio-Engineering Institute)

(Dr. R.N. Scott)

International Collaborative Study on Antibiotic Sensitivity Tests

(E. Arnold G. Branch)

Psycho-Social Research on Alcoholism

(Rev. Roland-E. Soucie)

Quebec

An Investigation of the Functions of the Ventro-Lateral Portion of the Human Thalamus, Hopital Notre-Dame, Montreal

(Dr. Claude Bertrand)

The Prediction of Functional Aerobic Capacity from various work regimes. Ecole d'Hygiène, Université de Montréal, P.Q.

(Eugene Doroschuck)

A Study of the Physiological Capabilities of Industrial Workers, Ecole d'Hygiène, Université de Montréal, Montréal

(Eugene Doroschuck)

Etude de l'absorption (ou de l'inhibition) par le placenta de la portion des anticorps qui produit la lésion du globule rouge (partie "lésante") Hôpital St-Sacrement, Québec

(Jean-Marie Delage)

Recherches chez l'homme sur la Substitution des Analgésiques narcotiques par les phénothiazines non toxicomanogènes, Université de Montréal

(Dr. A. Beaulne)

L'Etude de la fonction labyrinthique (projet - pilote) Hôpital Notre-Dame, Montréal, P.Q.

(Dr. Fernand Montreuil)

Coronary Heart Disease in a French-Canadian Population, Montreal Institute of Cardiology, Montreal, Quebec

(Dr. Paul David - Dr. Allard)

Effect of Hypoglycemic Agent (Phenothylbiguanide) on Prediabetes, Jewish General Hospital, Montreal, Quebec

(Norman Kalant)

Pseudo-Pregnancy with Norethynodral (Enovid) in the treatment of Rheumatoid Arthritis, Hôtel-Dieu de Montréal

(J. -Antoine Blais)

The Clinical Significance of Nocardia Asteriodes Isolated from
Pathological Specimens of Patients with Pulmonary Diseases, Royal
Edward Laurential Hospital, Quebec

(Dr. E. Mankiewicz)

The therapeutic effects of Excluded small bowel dialysis in
Chronic Uremia and the Pathological changes in the excluded
Segment, Royal Victoria Hospital, Montreal

(Dr. J.B. Dossetor)

Studies on Fluorine Metabolism - Macdonald College, Quebec
(L.E. Lloyd)

Studies on differential absorption of Radio-Active Strontium and
Calcium from the Gastrointestinal Tract in Laboratory Animals,
McGill University, Montreal, Quebec

(Dr. Stanley C. Skoryna & D.R. Webster)

Effets de la pollution de l'air sur les affections respiratoires
dans les groupements industriels et dans leur entourage, Ecole
d'Hygiene, Universite de Montreal

(Dr. F.J. Tourangeau)

Evaluation du seuil Gustatif au Chlorure de Sodium dans la
Prévention et le traitement de l'Hypertension Essentielle, Univ.
de Montréal et Hôpital St-Luc, Montréal, P.Q.

(Leon Tétreault)

Projet Pilote de dépistage du Diabète dans la population adulte de
la Province de Quebec, Principalement dans la ville de Montréal.
Association du Diabète de la Province de Québec, Montréal, P.Q.

(Drs. Lise Davignon et Marcel Cantin)

Public Health Hazards involved in indoor use and storage of Pesti-
cides in the Province of Quebec, University of Montreal

(Dr. F.J. Tourangeau)

Studies to Extend the Applicability and Increase the Safety of
Cardiac Surgery and Cardiopulmonary Bypass, The Montreal Children's
Hospital, Montreal, Quebec

(Dr. David R. Murphy)

Isolation and Characterization of the allergens in industrial and
farm dusts of plant origin, Montreal General Hospital, Montreal

(Samuel O. Freedman)

Clinico-Genetic Studies of the Epilepsies, Dept. of Genetics,
McGill University, Montreal

(Julius D. Metrakos)

Le test phonétique pour l'audiométrie vocale au Canada Français,
Hopital Maisonneuve, Montreal, Quebec

(Huguette Belfante)

Stenose Mitrale: Etude et évaluation comparatives du traitement
chirurgical et médical, Institut de Cardiologie

(Osman P. Gialloredo)

The reaction of Animal Tissues to Finely Divided Silica, McGill
University

(Orville F. Denstedt)

(A) Surgery of Chronic Coronary Artery Insufficiency

(B) Surgical Treatment of Acute Myocardial Infarction, McGill
University, Montreal

(Arthur M. Vineberg)

Etude Cytogénétique de Malformations Congénitales, Département de
Pathologie, Faculté de Médecine, Université Laval

(Paul Genest)

Factors Governing Renal Excretion of Acid in Gout, Hôtel-Dieu de
Montréal

(Guy Lemieux)

L'Insuffisance tricuspide seule et Associée à l'Hypertension
Pulmonaire, Importance Hémodynamique et Application Clinique,
Institut de Cardiologie de Montréal
(Dr. Pierre Grondin)

Effet des médicaments cardiaques (Digitaline, Quinidine, Amide
Procaine et Isoproterenol) sur des animaux porteurs d'un "pacemaker"
implantable avec et sans bloc auriculo-ventriculaire, Institut de
Cardiologie de Montréal
(Dr. Pierre Grondin)

Etude des réactions et de l'antigénicité de différents vaccins
contre la rougeole, Ecole d'Hygiène, Université de Montréal
(Dr. A. Roger Foley)

Uric Acid Excretion into the Intestine, Royal Victoria Hospital,
Montreal, P.Q.
(I.T. Beck, R.D. McKenna, J.B. Dossetor, K.J. McKinnon)

Epidemiological Study of an Outbreak of Histoplasmosis in Montreal
(Dr. J. Leonard Brandt)

Myopie progressive pathologique, étiologie et traitement chirurgical
actuel et à venir, service d'Ophtalmologie, Hôpital Notre-Dame,
Montréal, P.Q.
(Roland Cloutier)

Preventive and Diagnostic Screening for certain Metabolic Disorders
in the Newborn, The Montreal Children's Hospital, Montreal, Quebec
(C.R. Scriver)

Immunological and Serological Study of the Diagnosis of Trichinosis,
Institute of Parasitology, McGill University, Montreal
(Dr. Charles E. Tanner)

Mode of Action and Treatment of Chronic Intoxication with Carbon Tetrachloride and other Industrial Poisons, McGill University, Montreal

(David Rubinstein)

Étude de l'Electrophonocardiogramme foetal à l'Hôpital Notre-Dame, Montréal

(Michel J. Berard)

Evaluation de l'inoculation à la souris comme moyen quantitatif d'apprécier la pouvoir pathogène potentiel (pour l'Homme) de mycobacteries dites anonymes, Ecole d'Hygiène, Université de Montréal

(Dr. Maurice Panisset)

Oxygen at Increased Pressure, McGill University, Montreal

(Lloyd D. MacLean)

Survey of Anencephaly and Spina Bifida in the Province of Quebec, McGill University, Montreal

(Alison D. McDonald)

Ralentissement du rythme cardiaque effectif par l'utilisation de stimulations électriques synchronisées originant d'un "pacemaker" special, Institut de Cardiologie de Montreal

(Pierre Grondin)

L'électrocardiogramme continu chez le sujet normal et coronarien, Institut de Cardiologie de Montréal

(Dr. Paul David)

An Investigation into some Bacteriological and Biochemical Aspects of Fibrocystic Disease of the Pancreas, Montreal Children's Hospital

(Alan Ross)

Les Infections Néo-Natales et leurs Rapports avec les Moyens de
Défense Non-Spécifiques du Sérum - Role des Alpha-2-Iipoproteines
Hôpital du St-Sacrement, Québec

(Dr. Jean-Marie Delage)

Evaluation of the Therapeutic Efficiency of Different Brands of
Chlorothiazide as a Diuretic, Montreal General Hospital

(D.P. Tonks)

Research in Prosthetics and Orthotics - Institut de Réhabilitation
de Montréal

(Gustave Gingras)

Etude de certains amines et enzymes cérébraux chez le Schizophrène
et chez l'animal porteur de lésions affectant l'activité fonction-
nelle de centres rhinencéphaliques et hypothalamiques, Université
de Montréal

(Camille Laurin)

Studies on the Hyperactive Child, McGill University

(Taylor Statten)

Investigations into Etiology and Treatment of Respiratory Distress
Syndrome of Prematurity - Royal Victoria Hospital, Montreal, P.Q.

(R.H. Usher)

Comparative Studies of Adrenal Cortical Function in Aged Persons
with Acute Confusional States or Senile Psychosis, McGill University

(Dr. R.A. Cleghorn)

Etude du Mechanisme de l'hypertension artérielle, Hôtel-Dieu de
Montréal

(Dr. Jacques Genest)

Etudes Epidémiologiques, Génétiques et Expérimentales sur la
Tuberculose et les Vaccins à mycobactéries, Institut de Micro-
biologie et d'Hygiène de l'Université de Montréal

(Dr. Armand Frappier)

A Study of the Effects of the Nucleic Acids upon Memory (Retention)
Impairment in the Aged, McGill University

(Dr. V.A. Kral)

Depistage du Cancer par l'analyse du comportement Immunologique du
foie, Faculté de Medecine, Université Laval

(Dr. Didier Dufour)

Antibody Systems related to Allergy and Autoimmune Disease, Royal
Victoria Hospital, Montreal

(Bram Rose, Maxwell Richter)

Mise au point d'un nouvel appareil Coeur-Poumon Artificiel,
Institut de Cardiologie de l'Hôpital Laval, Québec, P.Q.

(Alphonse L'Espérance)

Etude sur le vieillissement, Université de Montreal

(Hans Selye)

Experimental Studies on the Management of Neurogenic Urinary
Dysfunction in view of improving the treatment and rehabilitation
of Children and Adult Paraplegics, McGill University and Royal
Victoria Hospital, Montreal

(Jacques G. Susset)

The Use of Programmed instruction for Evaluation and Remediation
of Communication disorders in Children, McGill University, Montreal

(D.G. Doehring)

Developmental Anomalies in the Newborn, the Montreal Children's
Hospital, Montreal

(David R. Murphy)

Erythropoiesis in the Premature Infant, the Montreal Children's Hospital, Montreal

(R.L. Denton)

Further Investigation into the recent outbreak of Histoplasmosis in Montreal, Jewish General Hospital

(J. Leonard Brandt)

1. A Study of the function and protracted tolerance of conditioned prosthetic valvular substitution
2. Tricuspid Insufficiency ...
3. Effect of Heart Drugs ...
4. Slowing of the heart rate by synchronized artificial electrical stimulation obtained with a special pacemaker

(Pierre Grondin, G. Lepage)

Study of the Initiation of Movement in Drug induced Catalepsy in Catatonia and in Parkinson's Disease, Montreal University

(C. Laurin)

Psychiatric Research in Clinical Criminology, McGill University

(R.A. Cleghorn)

Study of outpatients at the Montreal Children's Hospital (O.P.D.) McGill University (Department of Sociology and Anthropology)

(Alan Ross)

An Investigation into the causes of Death in Newborn Infants with Special Reference to Respiratory Disease, The Montreal Children's Hospital, Montreal

(D.V. Bates, M. McGregor)

The Study of the Surgery of Cerebral Palsy, the Montreal Children's Hospital, Montreal

(J.M. McIntyre)

Analysis of Behavioral Abnormalities Associated with Localized
Cerebral Lesions, McGill University

(Theodore Rasmussen)

A Study of Twins Discordant with Respect to Schizophrenia, McGill
University, Montreal

(G.A. Ferguson)

The Genetics of Reproductive Casualty in Human Beings, McGill
University and Montreal Children's Hospital

(F. Clarke Fraser)

Action de quelques contaminants radioactifs de l'environnement sur
la femelle en gestation et sur le fœtus, Ecole d'Hygiène,
Université de Montréal

(Joseph Sternberg)

Evaluation de l'activité normale et pathologique de la Glucose-6-
Phosphate Dehydrogenase (G-6-PD), Hôpital Ste-Justine, Montreal

(Albert Royer)

Mechanisms of Bacterial Allergy - The Montreal Children's Hospital

(H.L. Bacal)

Disturbances in Liver Function in Infants and Children, the
Montreal Children's Hospital, Montreal, P.Q.

(Alan S. Ross)

Research into Renal control of Acid-Base Balance in Diseases of
the Newborn, Royal Victoria Hospital, Montreal

(G.B. Maughan)

Les implications psychiatriques du fait d'être né d'un couple
interethnique (étude pilote), Université McGill

(E.D. Wittkower)

Etude de la Pollution de la Rivière Richelieu par le Dr Pakalnins,
Universite McGill

(Dr. Andrejs Pakalnins)

Problèmes de croissance chez l'enfant en relation avec l'intégrité
de l'axe Hypophyso-cortico-surrenalien et autres relations entre
l'Hypophyse et les autres organes cibles, Hôpital Ste-Justine,
Montréal, P.Q.

(J.R. Ducharme)

Étude de la Neuro et Psychogénétique biochimique du retard mental
chez les Canadiens-Francais, Université de Montreal

(Dr. André Barbeau)

Étude de l'influence des pouvoirs publics sur la santé - Société
d'Hygiène et de Médecine préventive de la Province de Quebec

(Dr. C. Pomerleau)

The use of Abdominal Decompression during the first stage of Labour,
St. Mary's Hospital, Montreal, P.Q.

(Dr. Louis J. Quinn)

Hypoglycémie et Hypocalcémie Néonatales - Hôpital Ste-Justine de
Montréal

(Bernard H. Doray, M.D.)

Evaluation of Results of Genetic Counselling, McGill University,
Montreal

(F. Clarke Fraser)

Surgical Research Laboratory, Laval University, Cité Universitaire,
Québec

(Dr. John A. Awad)

Studies in the Normal and Abnormal Physiology of the Newborn with
emphasis on the Management of Respiratory Failure. The Montreal
Children's Hospital, Montreal

(Dr. Leo Stern)

Serological and Immunological Methods in Human Food Allergy,
Montreal General Hospital, Montreal
(Samuel O. Freedman)

Selective Auditory Perception of Parental Voices
(N.B. Epstein)

Study of Psychiatric Cases Identified by Interview Survey and
Attempt to Persuade them to Receive Treatment
(Dr. H.B.M. Murphy)

Assessment of Hypothalamo-Adenohypophyseal-Adrenocortical Function
in Patients with Senile Psychosis or Cerebral Arteriosclerosis and
Normal Elderly Persons
(Dr. R.A. Cleghorn)

Mental Hospitalisation Patterns of Cultural, Religious and Occupa-
tion Groups in Canada
(Dr. E.D. Wittkower)

The Comparability of Psychiatric Assessments in Different Languages
and Cultures
(Dr. E.D. Wittkower)

Rétention placentaire des radiocontaminants de l'environnement
(Cesium 137) et corrélation entre la radiocontamination et les
embryopathies humaines, Université de Montréal
(Joseph Sternberg)

Epidemiological and Biochemical Study of Ocular Myopathy in French
Canada - Université de Montréal
(Dr. Andre Barbeau)

Food Values of Canadian Meats and Fish - McGill University
(Macdonald College)
(Dr. Florence A. Farmer - Dr. H.F. MacRae)

Ocular Anomalies in the Newborn - The Montreal Children's Hospital
(David R. Murphy)

Antigenic Analysis of Parasitic Amoebae, with Special Reference to
Serological Diagnosis of Human Amoebiasis, McGill University,
Montreal
(Dr. Eugene Meerovitch)

A Study of Primary Malabsorption in Childhood - The Montreal
Children's Hospital
(Eleanor R. Harper)

Review of Drug Use - Montreal General Hospital, Montreal
(Dr. John Ruedy)

Classification of Atypical Mycobacteria by Mycobacteriophage Typing
- Royal Edward Chest Hospital, Montreal
(Dr. Edith Mankiewicz)

Etude Epidémiologique de la Santé Bucco-Dentaire et de la Croissance
Crânio-Faciale et Somatique de l'Enfant Canadien Français de 6 à 16
ans - Faculté de Chirurgie Dentaire - Université de Montréal
(Dr. A. Demirjian)

Evolution de 100 malades opérés pour communication interventriculaire
Institut de Cardiologie de Montreal
(Dr. Ghislaine Gilbert)

Development of Analytical Methods for the Determination of Air
Pollutants and Study of the Formation of Carcinogenic Polynuclear
Hydrocarbons, Ecole d'Hygiene, Université de Montreal
(Sigmund Jegier, D.Sc.)

Étude sur les habitudes alimentaires de jeunes filles de milieu
étudiant de la région métropolitaine
(Estelle Mongeau)

The Development of Speech Communication Skills in Deaf Infants
Through the Use of Low Frequency Amplification, McGill University
and Royal Victoria Hospital, Montreal

(Prof. H.B. McHugh)

Étude des effets chroniques des insecticides chez l'homme Institut
de Microbiologie et d'Hygiène - Université de Montréal

(Dr. F.J. Tourangeau)

Managerial Data Processing System - Queen Elizabeth Hospital,
Montreal and Quebec Hospital Insurance Service

(John Partlo)

Tentative de spécifier les éléments thérapeutiques d'un milieu de
rééducation pour jeunes délinquants

(Francois Belpaire)

The Role of Conditioning in the Modification of Interpersonal
Attitudes

(Ernest G. Poser)

An Epidemiological Study of an Urban Population in Montreal -
Phase 3 - Data Retrieval Analysis and Publication - Institut de
Cardiologie, Montreal

(Paul David)

The Hyperactive Child VIII "Follow-Up Studies"

(Gabrielle Weiss)

Water Treatment by Reverse Osmosis Method - McGill University, Mtl.

(Dr. A. Pakalnins)

Étude de l'Interaction possible entre le DDT et certains
Médicaments Faculté de Pharmacie, Université de Montréal

(André Lamonde)

Pollution Atmosphérique et Île de Chaleur - École d'Hygiène,
Université de Montréal

(Claude Drouin)

Influence d'un Insecticide (Parathion) et de son Métabolite Actif
(Para-Oxon) sur l'Absorption Intestinale et sur la Concentration
Plasmatique de la Vitamine E (Tocopherol) Université de Montréal
(R. Goyer)

Seuil d'Apparition des Potentiels Oscillatoires de l'Electro-
rétinogramme dans le Depistage Précoce de la Rétinopathie Diabétique
- Hôpital Maisonneuve, Montréal
(Jean-Real Brunette)

A Study of Factors influencing the use of Medical Services -
Department of Epidemiology - University McGill
(Michael J. Ball)

Transfusion Related Hepatitis, The Montreal Children's Hospital
(Eleanor R. Harpur)

Évaluation du Degré de Pollution Atmosphérique par Mesures
Photosynthétiques, Université de Montréal
(Dr. Zygmunt Jegier)

La formation dans l'Atmosphère des Oxydants Nocifs à la Santé
Publique, Université de Montréal
(Dr. Z. Jezier)

Research Grants Related to Environmental Health Aspects of Mining
- McGill University, Montreal
(P.T.M. White)

Epidemiological Studies of Abortion and Congenital Defects -
McGill University, Montreal
(Alison D. McDonald)

Étude des Hémagglutinines Virales - Institut de Microbiologie et
d'Hygiène, Université de Montréal

(Vytautas Pavilans)

Studies in industrial dustiness (a) comparative evaluation of
assessment techniques (B) abatement of dusts by the application
froths and foam - McGill University, Montreal

(P.T.M. White)

Recherche d'agglutinines anti-leptospores chez certains travailleurs
- Université Laval

(J. Guy Cousineau)

Determination of the Phosphate content of natural waters, at the
nutrient level, by solvent extraction - McGill University

(G.C.B. Cave)

Ontario

Enterovirus Infections of Animals - Univ. of T.

(Dr. L.W. MacPherson)

Growth Hormone in Human Serum - H.S.C. -

(Dr. R.M. Enrich)

Allergic Inflammations - U. of Toronto

(Dr. J.W. Steiner)

Rheumatoid Arthritis - Queen's, Kingston

(Dr. N.A. Hinton)

Biochemical & Serological Relationships (Queen's)

(Dr. N.A. Hinton)

Normal and Pathological Altered Connective Tissue - Univ. of
Toronto

(Dr. H.Z. Movat)

Special Committee

Bone Disease - Toronto Western Hospital

(Dr. H.E. Meema)

Impairment of Shoulder Functions - Univ. of Toronto

(Dr. W. Anderson)

Survey of Drug Resistant Strains - Hamilton Health Assoc.

(Dr. A.R. Armstrong)

Thioridazine-Induced Pigmented Chorio-Retinopathy - Queen's

(J.M. DeMargerie)

Control and Treatment of T.B. Outside the Sanatorium

(Dr. E.A. Allen)

Allergens in Cement Dust - Univ. of Ottawa

(Lazarus J. Loeb)

Respirator Dynamics - Univ. of Ottawa

(L.P. Dugal)

Plasma Proteins in the Rheumatic Diseases - Univ. of Toronto

(M.A. Ogryzlo)

A Study of Nursing Personnel in Health Units and Municipal Health
Depts. Canadian Public Health Association

(A.T. Ferguson)

Toxicity of Drugs and Insecticides - Univ. of Toronto

(Drs. W. Kalow and E.A. Ellers)

Bronchial Disease - Univ. of W.O.

Tolerance to Anaesthetic Agents - Univ. of Toronto

(Dr. Iain M. MacKay)

Tolbutamide - Ottawa Civic Hospital

(Dr. J.B.R. McHenry)

University Research in the Field of Radiological Health - U. of T.
(John R. Brown)

Polluted and Unpolluted Atmospheres - Univ. of T.
(A.W. Brewer)

Evaluation of Hospital Admission X-Ray Programme (Dept.)
(Dr. Stefan Grzybowski)

Occupational Poisoning (Univ. of Toronto)
(Dr. John R. Brown)

Toxicity of Industrial Dust (U. of T.)
(John R. Brown)

Family Epidemiology in Relation to Medical Care (U. of T.)
(Dr. Harding LeRiche)

Corneal Opacities and Their Treatment (U. of T.)
(Dr. J.C. McCulloch)

Treatment of Corneal Opacities (U. of T.)
(Dr. J.C. McCulloch)

Diagnosis of Pertussis Meningitis & Enteritis - H.C.S.
(Dr. T. E. Roy)

Sociomedical Investigation 70 Years or More (U. of T.)
(Cope W. Schwenger)

Biological Properties of Echo Type Virus (U. of W.O.)
(I.B.R. Duncan)

Identification of Bacteria (Queen's University)
(Paul Chakwick)

Special Committee

Study of Nuclear Radiation (U. of T.)

(K.G. McNeil)

Virus Dissemination (H.S.C.)

(Dr. Donald K. McLean)

Reovirus Infections (U. of T.)

(Dr. K.R. Rozes)

Periodontal Structures (U. of T.)

(A.H. Hunt)

Diabetic Retinopathy, U. of T.

(Prof. J.C. McCulloch)

Haemodynamic Studies (H.S.C.)

(Dr. R.S. Fowler & Prof. H.F. Moody)

Haemodynamic Studies (H.S.C.)

(Drs. B.S.L. Kidd & R.S. Fowler & Prof. N.F. Moody)

Congenital Heart (H.S.C.)

(Dr. John D. Keith)

Rheumatic Fever (H.S.C.)

(Dr. John D. Keith)

Cardiac Failure (H.S.C.)

(Dr. George A. Trusler)

Electrocardiographic Techniques (H.S.C.)

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Dyspnoea (U. of T.)

(Colin R. Woolf)

Myocardial Infarction by External Photoscans (U. of T.)

(Ramsay W. Gunton)

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(G.W. Manning)

Cardiovascular Surgery (U. of T.)

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Function of the Heart (U. of Ottawa)

(Dr. Margaret Beznak)

Red Blood Cells by Freezing - (U. of Ottawa)

(J.R. Jackson - R.H. Smiley)

Sewage Bio-Oxidation - Ontario Research Foundation

Strontium and Calcium (U. of T.)

(Dr. J.R. Brown, Ph.D.)

Staphylococcal Antigen (U. of T.)

(Dr. W. Harding LeRiche)

Staphylococci in Enclosed Areas, Univ. of Ottawa

Tuberculosis Detection Programmes (Dept.)

(Dr. E.A. Allen)

Wading Pool Disinfectants - Univ. of Toronto

(Dr. J.R. Brown)

Equipment - Dept. of Med. (U. of W.O.)

(Lionel Reese)

Ontario Hospital Services Commission, Quo Vadis Project

(G.J. Sharpe)

Special Committee

Tannic Acid and Barium Sulphate - Queen's Univ.

(Eldon M. Boyd)

Drug Treatment in Genito-Urinary Tuberculosis (Toronto Hospital,
Weston)

(Dr. Wm. K. Kerr)

Cost of Health Services - Univ. of Toronto

(Dr. J.W. Abrams)

Hypertension and Renal Disease in Pregnancy (Women's College Hosp.)

(Drs. Jean F. Davey & Geraldine Maloney & Alice Gray)

Viral Diseases and Chromosomal Patterns (Queen's)

(Dr. Alex L. Bryans)

Brain Damage in Phenylketonuria (Queen's)

(N.W. Partington)

Calcium and Phosphorus Metabolism in Children (H.S.C.)

(Dr. D. Fraser)

Intrauterine Infections with Viruses (D.M. McLean)

Vitamin D (H.S.C.)

(Dr. Donald Fraser)

Intractable Asthma (H.S.C.)

(Dr. Cecil Collins-Williams)

Fluorescent Antibody Technique - U. of W.O.

(J.C. Rathbun)

Metabolic Disorders (Queen's)

(N.W. Partington)

Respiratory Infections of Cattle and Swine (U. of T.)
(Lachlen William MacPherson)

Aerosol in Laboratory Animals (U. of T.)
(John M. Beeckmans)

Study of the Unwed Mother (U. of W.O.)
(Drs. R.A.H. Klich & M.P. Wearing)

Thromboposiesis (H.S.C.)
(Peter D. McClure)

Interceptive Orthodontics (U. of T.)
(Dr. R.G. Ellis)

Legg - Perthes Disease (H.S.C.)
(Dr. R.B. Salter)

Hyaline Membrane Disease (Victoria Hospital, London)
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Idiopathic Respiratory Distress (H.S.C.)
(Dr. P.E. Conen)

Tissue Hypoxia (H.S.C.)
(Dr. P.R. Swyer)

Research and Training Unit - Ont. Crippled Children's Centre,
Toronto

Hypothyroidism in Secondary School Students (Ottawa Civic Hospital)
(J.B.R. McKendry)

Neo-Natal Cardiac Surgery (H.S.C.)
(Drs. W.T. Mustard & W. Singg)

Obstetric Patient (U. of T.)
(Dr. D.E. Cannell)

Cerebral Vascular Accident (Rehabilitation Institute of Ottawa)

(John F. Hamel)

Perinatal Mortality Study (U. of W.O.)

(Dr. R.A.H. Kinch)

Amniotic Infection Syndrome (Queen's)

(Dr. E.M. Robertson)

Prosthetic Heart Valves in Children (H.S.C.)

(Dr. G.A. Trusler)

Pesticides in Man (U. of T.)

(J.R. Brown)

Typing of Heroin (U. of T.)

(Prof. R.E. Jervis)

Death in Infancy (Queen's)

(Robert Steele, M.D.)

Fat-Mobilizing Substance at Different Ages (U. of W.O.)

(G.G. Hinton, J.R. Beaton & J.A.F. Stevenson)

Iron Deficiency Anemia in Childhood (U. of O.)

(Dr. D.J. Conway)

Plasma and Blood Volume During Pregnancy (U. of T.)

Medical School Applicants (Association of Canadian Medical Colleges)

(David G. Fish)

Graduate Degree Holders Association of Canadian Medical Colleges

(David G. Fish)

Pre-Fluoridation Survey - Brant County Health Unit

(E.A. Dunton)

Clinical Cancer Research - Ontario Cancer Institute

(Dr. C.L. Ash)

Fundamental Cancer Research - Ontario Cancer Institute

(Dr. C.L. Ash)

Disorders in Mental Illness (Ontario Mental Health Foundation)

(Dr. R.W. Payne)

Mentally Retarded Patients - Ontario Mental Health Foundation

(Dr. Harvey C. Stancer)

Biological Rhythms - Ontario Mental Health Foundation

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Normal, Retarded and Brain Damaged Children, Ontario Mental Health Foundation

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Clinical Cancer Research Ontario Cancer Treatment and Research Foundation

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Anxiety in Infancy - Ontario Mental Health Foundation

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Prediction in Alcoholism - Ontario Mental Health Foundation

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Special Committee

Outcome of Schizophrenia - Ontario Mental Health Foundation

(Dr. G.E. Hobbs)

Learning of Self-Control - Ontario Mental Health Foundation

(Dr. Richard H. Walters)

Emotional Factors - Ontario Mental Health Foundation

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Histoplasmosis and Atypical Mycobacterial Skin Testing (Canadian Tuberculosis Association)

(Dr. C.W.L. Jeanes)

Glaucoma Detection Scarborough Board of Health

Homosexual Behaviour - Ontario Mental Health Foundation

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Mediation of Mentally Retarded and Normal Children - Ontario Mental Health Foundation

(Dr. Ronald K. Penney)

Elderly Psychiatric Patients - Ontario Mental Health Foundation

(Dr. Morris M. Schnore)

Mentally Retarded Children and their Families - Ontario Mental Health Foundation

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Anxiety Reaction to Stress - Ontario Mental Health Foundation

(Dr. David L. Watson)

Causes of Perinatal Loss (U. of Ottawa)

(Dr. D.J. Conway)

Water Pollution - U. of T.

(T.W. Beak)

Rheumatic Diseases - Univ. of Toronto

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Evaluation of Results in General Practice - The College of Family
Physicians of Canada

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Dust Allergy - University of Ottawa

(Dr. Lazarus J. Loeb)

Inflammatory Reactions (U. of T.)

(Dr. Hugh A. Smythe)

Drugs and their Effects on the Fetus

(Dr. E.A. Sellers)

Biochemical and Serological Relationships #2

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Clinical Laboratory Procedures (Canadian Association of Pathologists)

(Dr. D. Murray Young)

Civil Rights, Liberties in Relation to Mental Disorder in Canada,
Canadian Mental Health Association

(F.C.R. Chalke)

Sabin Type 3 - Poliomyelitis Vaccine (Connaught Laboratories -
Univ. of Toronto)

(Dr. E.R.E. MacLeod)

Survey of Antituberculosis Drug Resistance, Hamilton Health Centre

(Dr. A.R. Armstrong)

Food Habits (University of Toronto)

(H. Milne and G.H. Beaton)

Environmental Health in Canada

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Demyelinating Diseases (U. of T.)

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Pertussis (U. of T.)

(A.C. Wardlaw)

Surgical Treatment of Emphysema (U. of T.)

(Colin R. Woolf)

Activated Sludge (U. of T.)

(Dr. Philip H. Jones)

Rates of Ingestion (U. of T.)

(John M. Beeckmans)

Hyperlipidemic Diseases (U. of T.)

(Drs. J.A. Little & W.H. LeRiche)

Emergency Ward and Ambulance System (U. of T.)

(John W. Abrams)

Hospital Electronic Equipment (U. of T.)

(J.W. Abrams)

Gastroenteritis (H.S.C.)

(Dr. Donald M. McLean)

Electrocardiography and Vectorcardiography (H.S.C.)

(Rodney S. Fowler)

Corneal Disease (U. of T.)

(Drs. Clement McCulloch & P.K. Basu & G.A. Thompson)

Data of Diabetic Patients (Ottawa Civic Hospital)

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Different Organizational Patterns

(Dr. John E.F. Hastings)

The Saling Technique (Univ. of T.)

(Dr. William Paul)

Poliovirus Survey (University of T.)

(Dr. D.R.E. MacLeod)

Body Counter (Univ. of Toronto)

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Medical Diagnosis - Queen's University

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Coulter Counting Technique - Univ. of Guelph

(Mr. W.R. Mitchell)

Viral Vaccines - Univ. of Toronto

(Dr. D.R.E. MacLeod)

Doctor-Patient Contacts - Queen's University

(Dr. R. Steele)

Medical Education in Canada - Association of Canadian Medical Colleges

(Dr. J. Wendell MacLeod)

Treatment of Domestic Sewage - U. of Waterloo

(P.L. Silveston)

Children's Social Development - Ontario Mental Health Foundation

(Dr. Northway)

Stuttering - Ontario Mental Health Foundation

(Dr. B. Quarrington)

Vicious Circle Behaviour - Ont. Mental Health Foundation

(Dr. R. Banks)

Effect of Amphetamine - Ont. M.H. Foundation

(Dr. H. Lebb)

Special Committee

Psychotic - Ontario Mental Health Foundation

(Dr. R. Gardner)

Comparative Investigations - Ont. Mental Health Foundation

(Dr. T. Ryan)

Psychological Development of Children - Ont. Mental Health
Foundation

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Human Plasmaphoresis - Canadian Red Cross

(G.W. Miller)

Chronically Ill Patients - Ontario Mental Health Foundation

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Motivation and Learning - Ont. Mental Health Foundation

(A.H. Black)

Effects of Cerebral Lesions - Ont. Mental Health Foundation

(Dr. Robert H. Knights)

Aversive Behaviour Therapy Techniques - Ont. Mental Health
Foundation

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Aquatic Ecosystem - Lakehead University

(Dr. G.W. Ozburn)

Echoencephalographic Survey - Ontario Mental Health Foundation

(Dr. D. Naldrett White)

Advanced Training for General Practice - The College of Family
Physicians of Canada

(H.H. Hetherington)

Nutritional Adequacy (U. of O.)

(Dr. Conway)

Medical Education - University of Toronto

(Jan. W. Steiner)

Research Position in Epidemiology - U. of Western Ontario

(G.E. Hobbs, M.D.)

Research Position in Epidemiology - Univ. of Toronto

(W. Harding LeRiche)

Air Conditioning and Filtration for Surgical Suites (Riverside Hosp.)

(Jackson R. Bryan)

Research Position in Biostatistics - Queen's University

(Dr. John H. Read)

Census of Nursing Personnel (Dept.)

(Isabel Black)

Medical Audience Educational Television Program (U. of W.O.)

(Andrew T. Hunter)

Iron Nutrition in Menstruating Women (U. of T.)

(G.H. Beaton)

Amoebiasis - Univ. of Western Ontario

(E.J.K. Penikett)

Diabetic Retinopathy - Univ. of Toronto

(Dr. J.C. McCulloch)

Artificial Cornea - Univ. of Toronto

(Dr. J.C. McCulloch)

Dental Care to Children, Dept. of Health, Borough of North York

(Dr. R.E. Feasby)

Electrocardiograms - Queen's

(Dr. J.A. Milliken)

Practical Diets - Univ. of Toronto

(Dr. J.A. Little)

Lipid Analysis of Cerebral Biopsies Hospital for Sick Children

(J.A. Lowden)

Mecolab Hospital for Sick Children

(Sanford H. Jackson)

Ozone and Chlorine - Ontario Research Foundation

(Dr. W.M. Campbell)

Purification of Wastewater - Ontario Research Foundation

(Dr. W.M. Campbell)

Removable Prostheses on the Oral Tissues (U. of T.)

(Dr. George A. Zarb)

Indices Describing Dental Resources (U. of T.)

(Dr. D.W. Lewis)

Coagulase - Negative Staphylococci (U. of T.)

(H. Farkas-Himsely)

Infectious Hepatitis - Univ. of Toronto

(Jonathan C. Sinclair)

Medical School Applicants and Students (Association of Canadian
Medical Colleges)

(D.G. Fish)

Algal Bloom Conditions (Univ. of Toronto)

(Dr. P.H. Jones)

Community Health Care - University of Toronto

(Dr. Richard Wilson)

Rabies Vaccine (Univ. of Toronto)

(Dr. Paul Fenje)

Organization of Health Care (Queen's Univ.)

(R.D. Fraser)

Value of a Public Health Nurse to a Group of General Practitioners

(East York-Leaside Health Unit)

(Dr. Helen M. Carpenter)

Medical Care of Patients - Kingston General Hospital

(D.M. MacIntyre)

RH Immunization McMaster University

(Alvin Zipursky)

Stabile Serum Alkaline Phosphatase in Pregnancy, St. Joseph's
Hosp., Hamilton

(G.J. Quigley)

Differences in 'REM' Sleep - Ontario Mental Health Foundation

(Dr. J.B. Knowles)

Retardates Ontario Mental Health Foundation

(Dr. Frederick R. Sergovich)

Improvement on a Chronic Ward - Ont. Mental Health Foundation

(Dr. J.R. Dukszta)

Pharmacologic Effects - Ont. M.H.F.

(Dr. D.A. Chambers)

Psychiatric Interview Transcripts - Ont. Mental H.F.

(Dr. Zenon Walter Pylyshyn)

Special Committee

Psychiatric Syndromes - Ontario Mental Health Foundation

(Dr. William J. Craig)

Basic Research on Cancer - National Cancer Institute of Canada

(Dr. R.M. Taylor)

Pharmaceutical Services - Canadian Pharmaceutical Association

(R.W. Nichols)

Manitoba

Vulnerability to Infection of Manitoba Indian Infant and Child

(Dr. A.J. DePage)

Pilot Study of Alcoholism in Tuberculosis Patients

(Dr. G.C. Sisler)

A Study of the Amniotic Fluid in Rh Disease

(Dr. D. Grewar)

Pulmonary Ventilation-Perfusion Ratios in Cardio-Pulmonary Disease

(Dr. R.M. Cherniack)

Rate of Scleral Stretch in Ocular Refraction

The Relationship Between Mental Health and Personality Characteristics of the Mennonite Community in Manitoba

(Dr. Morgan W. Wright)

Hospital Disinfectants

(Dr. Peter Warner)

Studies of the Influence of Various Chemotherapeutic Agents on the Resistance to Air Flow in Children with Obstructive Bronchial Disease

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The Use of Reconstituted Collagen in Surgery

(Dr. Colin C. Ferguson)

Analysis of Hospital Procedures Affecting Utilization of Services
and Patient Stay Temporary

(M.G. Saunders)

Domestic Water Reclamation and Sewage Disposal Studies

(R.E. Chant)

Ultra-Sonic Sounding in Diagnosis of Cerebral and Cerebro-Vascular
Disease

(Dr. M.G. Saunders)

Psychiatric Aspects of Medical Maximum Care

(Dr. John Adamson)

A Study of Serum - Globulin in Infants

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A Study of Urinary Tract Infections in Children

(Hugh Taylor)

Automatic Fraction Collector

Diagnosis of Intravascular Coagulation and Fibrinolysis

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Winnipeg Sewage Lagoon Investigations

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Arterial Blood Cases in Infants with Spontaneous and Controlled
Respiration

(Dr. Thomas J. McCaughey)

The Relationship of Renal Disease to Pregnancy

(Dr. R.M. Roulston)

Automatic Analysis of the Electroencephalogram for Probability

Diagnosis of Cerebral Disease

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Fetal Transfusion in Utero

(T.M. Boulston & B. Chown)

The Assessment of the Value of Measuring Simultaneous Recordings
of Intra Uterine Pressure and Foetal Heart Rate During Normal and
Abnormal Uterine Action

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1) Investigation of Gingival Diseases in Adolescent Winnipeg
School Children

2) The Principle Reason for Tooth Extractions

(Dr. J.R. Trott)

The Prevention of Isoimmunization in Rh Negative Mothers

(A. Zipursky)

Evaluation of Public Health Services for Infants and Pre-School
Children in the Province of Manitoba

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A Correlative Study of the Electroencephalogram in Old Age

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Review of Drug Use

(Dr. John Ruedy)

Psychological Implications of Cystic Fibrosis and other Chronic
Diseases of Childhood

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Mechanics of Breathing in Children

(Dr. P.K. Adikari)

The Habilitation of Children who were Premature at Birth

(J.L. Asselstine)

A Morphologic Assessment of Chronic Obstructive Lung Disease in a
Metropolitan Area

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Bio-Mechanical Laboratory - Prosthetic and Orthotic Research
Development Unit

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Evaluation - Community Psychiatric Services

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Basic Research in Cancer

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University of Manitoba Follow-up

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The Use of Hyperbaric Oxygen in a) Renal Ischaemia b) Experimental
Tumors

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Deep Freeze (-65°C) - For Storage of Selected Biologicals Used in
Allied and Basic Research

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Automated Hospital Systems and Procedures

(E.A. Hodson)

An Investigation into some Aspects of the Pathogenesis and
Metabolic Effects of Low Birthweight in Animals

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Investigation of the Mechanism of Hypoglycemia in Low Birthweight
Infants

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The Epidemiology of Cretinism and Goitre due to Congenital Thyroid Deficiency

(Dr. John A. Moorhouse)

The Preparation and Evaluation of Wetting Dentures for Adhesion and Retention

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Development of a Hospital Systems Methodology for Computer Feasibility Studies

(Dr. K.R. Brown)

A Comparative Study of Mental Disorders in Mennonite and Non-Mennonite Hospital Population

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pH and Calcium and Phosphate Levels in Exposed Dental Pulp

(C.R. Castaldi)

Carbohydrate Calcium, Phosphate and Ash Levels of Dental Plaque as Predictors of Caries Susceptibility in Humans

(Dr. Israel Kleinberg)

Arable Land Degradation by Effluent Pollution

(George D. Balacko)

Water Conditioning of Modified Wading Pool and Swimpools

(J.N. Warrenner)

Study of Folic Acid Deficiency in Infancy and Childhood

(Abdol Majid Shojania)

Undernutrition in Aged People

(J.E. Morrison & J.A. Moorhouse)

Cardiopulmonary Resuscitation Research

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Rodents as Source of Human Helminthic Infections, U. of Man.

(Mr. G. Lubinsky)

The Natural History of the Major Chronic Degenerative Diseases

(Dr. R.G. Cadham)

Study of Post-Surgery and Post-Anaesthesia Mortality

(Dr. M. Minuck)

Dental Health Needs, Dental Care Demands and Attitudes of University
Dental School Clinic Patients

(Douglas L. Rennie)

Traffic Accident Research Project

(Dr. D.M. Bruser)

Identification of and Prediction of Non-Medical Factors Leading to
Better Utilization of Active Treatment Hospital Beds and Facilities

(Dr. Kenneth Brown)

Psychological Variables Encountered in the Diagnosis of Develop-
mental Dyslexia as a Congenital Anomaly

(N.E. Girardin)

An Investigation of the Characteristics of Those Patients who
Attend the University of Manitoba Dental Clinic

(H.A. Grimsrud)

The Course of Diffuse Non-Progressive Cerebral Disease in Adults

(George C. Sisler)

An Investigation of Organic Cerebral Changes in Psychiatric Patients

(Dr. R.G. Bankier)

Assessment of Craniofacial Growth in Mongolism

(Dr. J.F. Cleall)

Social Class and Dental Health

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Estimation and Prediction of Foetal Weight in Normal and Abnormal
Pregnancies using Ultrasound Techniques

(Dr. T.M. Roulston)

Prevention and Treatment: RH Sensitization & Disease

(Drs. T.M. Roulston & J.M. Bowman & Dr. Chown)

Oral and Intravenous Glucose Tolerance Tests and the Serum Insulin
Response to Glucose in Pregnancy: Relationship of Abnormalities to
Retal Morbidity and Mortality

(Drs. Philip H. Barnes & Norman J. Rosen)

Arteries and Pia Mater of Normal and Atrophic Human Cerebral Cortex
and their Role in the Pathogenesis of Cerebral Palsy, Mental
Retardation and Convulsive Disorder

(Dr. John Baskerville)

The Development of a Psychological Test Battery for the Diagnosis
of Brain Damage in Adults

(Morgan Wright Ph.D.)

Follow-Up Study of Children Treated at a Child Guidance Clinic
over a 10 year Period

(Dr. A.H. Moyes)

Qualitative and Quantitative Staffing Patterns of Nursing Personnel
Relating to the "Index of Care"

(Dr. J.A.H. MacDonell)

Serological Survey of W.E.E. Antibodies in Man

(Dr. E. Snell)

Research Position in Preventive Dentistry

(Dr. Neilson)

Saskatchewan

The Role of Purified Capsular Material in the Resistance of Mice
to Encapsulated S. Aureus

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Investigation of Electrical Techniques of Anaesthesia

(Drs. Wyant and Holmlund)

Studies to Determine the Role Played by Snakes Species found in
Sask. in Western Equine Encephalomyelitis

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A Clinical Study of the Effects of Exposure to Grain Dust

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Study of Prevalence of Antibodies to Western Equine Encephalitis
Virus in Selected Areas of Saskatchewan

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A Prospective Study of Viral Hepatitis Following Multiple Blood
Transfusions

(Dr. Peter B. Peacock)

Radioisotope Scanning of the Pancreas

(Dr. W.E. Hirte & K.S. Preston, M.B.)

Anaerobic Lagoons a Field and Laboratory Study of their Efficiency
and Limitations

(C.R. Forsberg)

Investigation of the Nature of the Antibodies to Penicillin and its
Derivatives

(M. Epp)

Special Committee

The Distribution of Species of Coliform Bacteria in Canadian Dairy Products with Special Reference to the Incidence of Pathogenic Serotypes of Escheichia Coli

(Dr. G.A. Jones)

Studies concerning Western Equine Encephalitis (Wee) Virus in Sask. Vertebrates and Mosquitoes

(A.N. Burton)

Gastro-Intestinal Function and its Relationship to Dietary Factors in Infants and Children

(Dr. J.W. Gerrard)

Etiology of Otitis Media in Infants and Children - O.E. Laxdal

A Study of Psychiatric Problems in General Practice

(D.C. McKerracher)

A Series of Experimental Investigations of the Value of Various Behavioral Indices in Predicting Work Performance of Mentally Retarded Adults

(Dr. A.J. Beddie)

A Re-evaluation of the Double-Blind Procedure

(Dr. N. Mc. Agnew)

A Systematic Study of Multiple Behavioral and Biological Factors in Psychiatric Illness, Prognosis and Treatment

(Dr. G. Merjerrison)

Aspects of Mental Illness: A comparison of French-Speaking and English-Speaking Communities

(Dr. H.G. Lafave)

An Investigation of the Treatment of Psychoneurosis with LSD-25 in the Out-Patient Service of a General Hospital

(Dr. A. Hoffer)

Science Policy

1963

Research Units:

University of Alberta \$50,000

Special Equipment Grant + 15,000

University of Montreal \$25,000

 /66-67 25,000

University of Toronto \$50,000

Analogue Computer 11,000

Refund \$242.03

A Double Blind Controlled Comparison Study of Triperidol and
Trifluoperazine for Treating Acute Schizophrenia

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A Study of Possible Relationships that Exist Between the
Excretion in the Urine of Hydroxyskatole Conjugates and the
Clinical State of Psychiatric Patients

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Objective Psychological Tests for Schizophrenia

(Dr. Hoffer)

A Study of Comprehensive Psychiatric Care in an Open Ward
General Hospital

(Colin M. Smith)

An Exploratory Descriptive Analysis of the Work of a Medical
Social Worker in a Group Medical Practice

(Dr. S. Wolfe)

Proposed Study of Hospital Financial Management

(Mr. E.L. Dick)

An Exploratory Survey of Mental and Emotional Disturbance
Amongst University Students

(Dr. Colin M. Smith)

An Enquiry into the Services Provided Under the Saskatchewan
Medical Care Insurance Act 1961 in Order to Identify and Measure
Major Reasons for Apparent Changes in Cost and Utilization

(Gordon Forsyth and Lothar Rehmer)

The Saskatchewan Study of the Centralized Teaching Program
for Nursing Students and Participating Hospitals and Schools
of Nursing

(Miss Phyllis H. Baker)

Anaerobic Lagoons: A Field and Laboratory Study of their
Efficiency and Limitations in Sewage Treatment

(C.R. Forsberg)

Studies in the Ecology of Western Encephalitis in Saskatchewan

(J.G. Rempel)

Prediction of Performance on Institutional and Non-
Institutional Jobs for the Retarded

(Dr. A.J. Beddie)

The Relation of Meaningfulness of Verbal Material to
Disorders of Thinking

(Dr. A. Hoffer)

Follow-Up Study of Chronic Psychiatric Patients

(H.G. LaFave)

Congenital Dislocation of the Hip in Saskatchewan Indians:
A Clinical and Radiological Study of Prevalence, Etiology
and Natural History

(C. Stuart)

Development of Computer Simulated Model of an Information
System for a Teaching Hospital

(Dr. R.M. Begg & Elizabeth J. Ives)

Survival and Multiplication of Enteropathogenic and Non-
Enteropathogenic Coliform Bacteria in Canadian Dairy Products

(Dr. G.A. Jones)

Special Committee

A Study of the Provision of Prostheses, Appliances and
Orthopaedic Shoes to the Residents of the Province of Saskatchewan
(Dr. V.L. Matthews)

A Descriptive and Exploratory Analysis of the Work of a
Psychiatric Social Worker in a Group Medical Practice
(Dr. David A. Road)

Ad Hoc Committee of Nursing Education

A Cost Study of Nursing Education in Saskatchewan

A Study of Saskatchewan Post Diploma Nursing Education Program
(Mr. N. Duane Adams)

A Study of the Retention and Future Education of Sask. Nurses
Study of Nursing Services
(Dr. V.L. Matthews)

Western RH Immunization Prevention Program
(Albert B. Brown)

Aerated Lagoons and Anaerobic Reactors: A Field and Laboratory
Study of their Efficiencies & Design Principles in Sewage
Treatment
(C.R. Forsberg)

Improved Physical Aids to Walking for the Disabled
(T.E. Hung, M.D.)

The Discharged Chronic Mental Patients and the Burden on the
Community
(Dr. F. Grunberg)

Community Adjustment and Job Performance of the Mentally
Retarded: Criteria Development and Prediction
(Dr. A.J. Beddie)

Specific Genes in the Determination of Diagnosis, Prognosis and
Out-Come of Psychiatric Illness
(D.G. Irvine)

A Study of the Relationships Between Questionnaire Symptomatology
Socio-Economic Status and Illness

(Dr. Wilfred Cassell)

A Study of Referral and Treatment Patterns Before and After the
Opening of a Modern "Total Care" Psychiatric Facility

(Alfred H. Neufeldt)

Western Equine Encephalomyelitis Studies

(Dr. D.R.E. MacLeod)

Incidence of Milk Allergy or Sensitivity

(J.W. Gerrard)

Nocturnal Enuresis - A Study of Patterns of Micturition in
Children with Nocturnal Enuresis and their Modification by
Dietary (Foods) and Mechanical (Wet Alarms) Factors

(J.W. Gerrard)

Surveillance and Study of Proven Cases of W.E.E. Reported
(1963-65) in Saskatchewan

(Drs. D. Menzies & H. Grocott)

Feasibility study for Automatic Analysis of Electrocardiograms

(L. Horlick)

Epidemiology Research and Teaching, Extension in the College
of Medicine, University of Saskatchewan

(V.L. Matthews)

A Study of Antibody Levels in Saskatchewan

(D.W. Menzies)

A Study of the Incidence of Non-Reportable Communicable Disease

(D.W. Menzies)

Dental Disease Epidemiological Studies in Saskatchewan Based
on World Health Organization Type A and Type B Surveys

(C.W.B. McPhail)

Alberta

The Effect of Anti-Depressive Treatment on Extinguished
Conditioned Responses in Depressive Psychosis

(R.R. MacLean)

Epidemiology of Brucellosis Among Eskimos

(Dr. R.D. Stuart)

Evaluation of Coleman Model 34 Chem-Matic for Automatic Blood
Chemistry Analysis

(Dr. R. Edward Bell)

Amniotic Fluid Analysis - An Aid in Antenatal Diagnosis of
Hemolytic Disease in the Newborn

(Allan G. Stewart)

Investigation and Treatment of Amblyopia and Accentric
Fixation According to the New Techniques of Pleoptics

(J.W. Duggan)

The Application & Comparative Evaluation of New Serological &
Cultural Procedures in the Detection of Leptospirosis

(R.D. Stuart)

Investigation of the Possible Viral Aetiology of those
Respiratory Conditions in which a Bacterial Agent Cannot be
Identified

(Odosca Morgante, M.D.)

A Study of the Eruption of Teeth & Growth of Jaws in Normal
Children from Birth to Three Years of Age & a Survey of
Dental Health in Chronically Ill Canadian Children

(R.P.D. MacRae)

Periodic Hemodialysis in the Management of Chronic Uremia and
its Effects on Hypertension and Anemia

(Lionel E. McLeod)

Therapy of Depression

(Dr. Keith A. Yonge)

Transport Media for Water and Sewage with Special Reference
to Differential Diagnosis of Members of the Coliform Group
(Anne M. Bursewicz)

A Follow-Up Survey of the Effectiveness of a Provincial Child
Guidance Clinic in Rural Communities
(Dr. A.R. Schrag)

An Investigation of the Variability of the Faculty of Outflow
of Aqueous Humor from the Human Eye in Normal & Glaucomatous
Subjects
(Dr. T.A.S. Boyd)

Study of Physiological and Biochemical Alterations in
Severely Traumatized Patients
(Dr. Brian J. Sproule)

A Study of Various Treatments of Thumb and Finger Sucking and
Their Psychological and Dental Effects
(Dr. R.D. Haryett)

Study of the Effectiveness of Fluoride Containing Prophylaxis
Pastes in Reducing Dental Caries in Children
(P.D. Finnigan)

The Prediction of Amentia Level in Mongolism
(David Gibson Ph.D.)

Screening for Pesticides in Dairy, Meat, Egg and Other Food
Products as a Public Health Measure
(J.H. Brown)

Bromination of Swimming Pool Waters
(Mr. H.L. Hogge)

Characterization of Ten Strains of Eastern Equine
Encephalomyelitis
(Odosca Morgante)

Special Committee

Aeration of Anerobic Sewage Pond Effluent

(Mr. N.J. Deck)

An Investigation to Discover the Types of Amblyopia which will
Benefit by Pleoptic Treatment and the Minimum Amount of
Treatment Required to Give Useful Results

(Dr. T.A.S. Boyd)

An Investigation of the Effect of Topical Cortico Steroids on
the Intraocular Pressure of Non-Glaucomatous Eyes whose Angles
Contain a Woolly Substance

(Dr. T.A.S. Boyd)

Therapy of Depression Objective Indicators for Different
Therapies of Depression and Dimension of Depression

(Keith A. Yonge)

Factor Analytic Studies of Tests of Human Brain Damage

(Joseph R. Royce)

Gamma Radiation Used for the Preparation of a Non-Infective
WEA Antigen

(Dr. Odosca Morgante)

Development and Evaluation of Training Techniques for Medical
General Practitioners

(Dr. E.R. Haynes)

Evaluation of the Gel Diffusion Method for the Detection of
Enterotoxin in Staphylococci Isolated from foods

(Dr. R.D. Stuart)

Objective Indicators for the Diagnosis and Treatment of
Depression Illnesses

(Dr. Keith Yonge)

Calcium Metabolism in Chronic Renal Failure and the Influence
of Long-Term Intermittent Hemodialysis

(Lionel E. McLeod)

An Investigation of the Relationship of the Depth of Retinal
Suppression to the Tendency to Develop Double Vision in
Strabismus

(Dr. T.A.S. Boyd)

Memory Storage and Brain Damage

(A.E.D. Schonfield)

Measurement of Anxiety and Depression within a Psychiatric
Population

(Charles Gerard Costello)

Identification and Laboratory Diagnosis of Amino Acid Disorders
that Lead to Mental Retardation in the Newborn

(Donald J. Campbell)

Assessment of the Variability of Radiation Damage by the
Leucocyte Culturing Method

(Dr. Jan Weijer)

Ecology and Epidemiology of Arbovirus Infection in Alberta

(Odosca Morgante)

Exposure of Dental Workers to Mercury and Mercury Alloys

(Dr. H. Buchwald)

Health Services - Their Non-Utilization

(Dr. Stanley Greenhill)

An Evaluation of Commonly used Vehicles for the Administration
of Sodium Fluoride Supplements

(W.J. Simpson)

An Investigation into the Effect of Grain Dusts (Organic) on
the Pulmonary Health of the Operators of Grain Elevators in
Alberta

(H. Siemens)

Special Committee

Health Care Utilization Patterns of Albertans Pre and
Post - July/68

(Dr. Stanley Greenhill)

The Amnesic and Therapeutic Effects of ECS

(Dr. C.G. Costello)

Therapeutic Implications of a Revised Differentiation of
Depressive States

(Dr. Keith A. Yonge)

Study of the Provision of Dental Care for Handicapped and
Chronically Ill in the Province of Alberta

(Dr. P.D. MacRae)

British Columbia

Gas Chromatographic Techniques for the Identification of Low
Concentration of Atmospheric Pollutants

(Dr. Ian H. Williams)

Investigation of Improved Methods for Controlling Schistosome
Dermatitis in B.C. Lakes

(Dr. C.C. Walden)

Development of Surgical Relief of Tricuspid Valve Atresia
by Right Atrial-Pulmonary Artery Shunt

(Dr. Peter Allen)

Establishment of a Glaucoma Service to Include Clinical and
Basic Research

(Dr. A.J. Elliot)

Evaluation of Serum Hormonal Iodine Levels in Early Infancy

(Dr. G.R. Kerr)

Tonography and Water-Drinking Tests for Detecting Glaucoma
Among Hospital Patients

(Dr. R.L. Wiggins)

The Salmonella Problem-Transmission of Salmonella from Animal Feed to Animal and Agricultural Products and Thus to Man

(Dr. Ernest J. Bowmer)

- (1) Diabetic Retinopathy Programme
- (2) Retinal Detachment and Glaucoma Study
- (3) Laser Project
- (4) Cryotherapy Project
- (5) Retinoschisis Studies
- (6) Study of Photo-Coagulation of Vascular Lesions

(Dr. A.J. Elliot)

Chromosome Studies on Some Individuals with Mental Defect

(Dr. J.R. Miller)

An Investigation of Methods of Producing Respiratory Insufficiency in Dogs in Order to Study the Effects of Treatment with High Atmospheric Pressure

(Dr. P.G. Ashmore)

An Epidemiological Survey of the Prevalence of Chronic Respiratory Disease and Peptic Ulcer Symptoms in Chilliwack City, B.C.

(Dr. D.O. Anderson)

A Study of the Variety and Relative Prevalence of Mold Spores and Pollens in Vancouver and Their Possible Relation to Human Respiratory Allergy

(Dr. J.D. Horan)

Chronic Simple Glaucoma - The Setting up of a Statistical Pilot Study to Evaluate the Parameters which may Subsequently be Used in a Collaborative Study to Assess the Long Term Effect of Ocular Dynamics on Visual Function

(Stephen Michael Drance)

Chronic Simple Glaucoma. The Setting up of a Statistical Pilot Study to Evaluate the Parameters which may Subsequently be Used in a Collaborative Study to Assess the Long Term Effects of the Ocular Dynamics on Visual Function - St. Joseph's Hospital - Victoria, B.C.

(R.L. Wiggins)

A Review of the Diagnosis and Frequency of Chronic Nonspecific Respiratory Disease in the Vancouver General Hospital Out-Patient Department

Specific Measurement of Trypsin and Chymotrypsin in Stool and Assessment of Pancreatic Enzyme Substitution Therapy in Patients with Cystic Fibrosis

(Dr. Margaret Mullinger)

Clinical Trial of the Polarcardiograph

(A.D. McKenzie)

Clinical Investigation into the Results of Surgery for Peptic Ulcer Disease

(A.D. McKenzie)

Studies in Production and Treatment of Respiratory Insufficiency in the Experimental Animal

(Dr. P.G. Ashmore)

A Study of the Effects of Hyperbaric Oxygen Atmospheres on Animals

(Dr. Wm. C. Trapp)

A Retrospective Examination of the Validity of the Certification of Deaths from Pulmonary Emphysema

(Dr. D.O. Anderson)

The Use of Slow Constant Infusion Intravenous Glucose
Tolerance Test, Etc. with Diabetes Mellitus, Vancouver
General Hosp.

(A.R.M. Cairas)

Studies on Some Aspects of Thyroid Disease in B.C.

(H.W. McIntosh)

A Description of the Clinical Course of Otitis Media in
Indian Children

(Dr. R.W. Morgan)

Functional Capacity of Patients Before and Following Open
Heart Surgical Correction of Mitral or Aortic Valve Lesions

(Albert R. Cox)

Study of Inactive Tuberculosis and Evaluation of Chemoprophylaxis
in Prevention of Reactivation

(Dr. Stefan Grazybowski)

A Comparison of School Absenteeism and Respiratory Function
in Grade I Students at Port Alberni/Alberni and at Chilliwack,
B.C.

A Study of Acid-Base Balance and the Effect of a Mechanical
Ventilator During Anaesthesia

(Dr. G.F. Clark)

What is the Nature of Dental Public Health - Its Objectives

(Harry Knowlton Brown)

P-Methoxyphenyl Derivatives in Human Urine

(W.C. Gibson)

A Development and Validation Study of Psychometric Tests of
Mental Impairment in Brain-Damaged Children

(William H. Gaddes)

Special Committee

Application of Cochlear Microphonics to Objective Testing of
Hearing in Infants

(Kenneth Cambon)

A Study of Hypoglycemia in the Newborn Infant Utilizing a
Radio Immunoassay for Plasma Insulin

(Dr. J.A. Birkbeck)

Use of Positive Extracorporeal Pressure During Expiratory
Phase of Respiratory Assistance in Neonatal Respiratory Distress

(Sydney Segal)

Measurement of Respiratory Mechanics to Demonstrate the Effects
of Current Practices in the Care of the Newborn Infant

(Sydney Segal)

Developmental Bio-Assay of Early Brain Injury

(W.C. Gibson)

A Study of the Physiological Aspects of Estrogen Excretion
in the Puerperium

(Dr. C. W. Carpenter)

Metabolism Function and Localization of Central Amines

(William C. Gibson)

A Preliminary Study of Dysacusis in Children

(David C. Kendall)

The Prevalence in School Age Children of Hearing Loss Due to
Secretory Otitis Media and Other Middle Ear Pathology with
Particular Reference to the Relation Between Atopy and Secretory
Otitis Media

(G.C. Robinson)

The Comparison of Air Quality and Meteorology Between Port
Alberni/Alberni and Chilliwack

(Donald O. Anderson and John H. Smith)

An Investigation of Short Term Memory and Neural Excitability
with Special Reference to Elderly, Memory Disordered
Psychiatric Patients

(W.K. Caird)

Determination of Heterozygosity for Phenylketonuria and its
Possible Relationship to Mental Illness

(Thomas L. Perry)

Neurological and Ophthalmic Disorders in Children of Low Birth
Weight - A Prospective Study with a View to Earlier Detection
and Treatment of Abnormalities

(G.H. Dunn)

The Effect of Some Commonly Used Drugs in Obstetric Practice
Upon Placental Enzymes

(Dr. F.J. deMaria)

Comparative Study of Long Term and Short Term Withdrawal of
Narcotic Addicts Voluntarily Seeking Comprehensive Treatment

(Miss Igeborg Paulus)

The Possible Relationship of Colour Blindness to Reading and
Arithmetical Difficulties

(Allan Stewart Arneil)

Studies on the Incidence of Post - I 131 Therapy
Hypothyroidism

(N.W. McIntosh)

The Role of Catecholamines in the Fetus and Newborn

(Dr. Towell)

Specific Measurement of Trypsin and Chymotrypsin in Stool of
Children with Mucoviscidosis

(Dr. M. Mullinger)

A Study of Speech Delay in Children, with Particular Reference
to those Cases Uncomplicated by Significant Hearing Loss or
Mental Retardation

Special Committee

The Detection of Hearing Loss in Newborn Infants

(David C. Kendall)

A Prospective Analysis of Potential Medical Students at the
U. of B.C.

(John F. McCreary)

An Investigation into the "Generic Equivalency" of Commercial
Preparations Containing Either Phenylbutazone or Prednisone

(M. Pernarowski)

Application and Evaluation of Desensitization Techniques with
Chronic Alcoholics

(Thomas Storm)

Epidemiologic Studies in Hospital Psychiatric Illness

(Dr. J.S. Tyhurst)

Studies on Air Conditioning, Air Filtration and Air Circulation
for Surgical Suites

(Dr. W.H. Sutherland)

The Etiology of Non-Gonococcal Urethritis, Its Relationship
to Mycoplasmas and also to Reiter's Syndrome

(Dr. Denys K. Ford)

Neuropsychological Assessment of Brain Damaged Children

(K. Klonoff)

Study of High Tone Hearing Loss in Children with Particular
Reference to Delay in Diagnosis and Etiological Factors

(Dr. Geoffrey C. Robinson)

Changes in Pyruvate and Lactate During Anaesthesia

(Dr. G.F. Clark)

Extension of Current Observations that Melanogenesis is
Abnormal in Schizophrenic Subjects

(A.C. Greiner)

A Study of the Relationship Between Neurological Variables,
Audiometric Measures and Auditory Perception in Children with
Normal Audiogram and Indications of Marked Auditory
Imperception

(William H. Gaddes)

Chlorinated Hydrocarbon Pesticide Storage in Residents of
the Okanagan Valley

(Drs. A.A. Larsen & J.H. Smith)

A Prospective Analysis of Attrition at the Four Western Can.
Medical Schools

(Dr. John J. McCreary)

A Survey of Dental Public Health Within the Dental Profession
and Within Public Health Agencies, Including Those of Govern-
ment

(Harry Knowlton Brown)

- (1) An Evaluation of Ophthalmic Artery Pressures in
Relationship to Visual Field Defects in Glaucoma;
- (2) A Study of Steroid Responses of Intraocular Pressure
in Myopic Children

(Dr. A.J. Elliot)

Investigations into Techniques for Improving the Amount of
Efficiency of Oxygen Incorporation into Rapid-Rate Biological
Waste Treatment Systems

(Craig Walden)

Special Committee

A Study of Physical and Chemical Changes in the Circulating
Blood During Cardiopulmonary Bypass (U. of B.C.)

(Dr. P.G. Ashmore)

Determination of Incidence Rates and Recurrence Risk in
Cleft Lip and Palate in B.C. Indians

(Dr. Brian Lowry)

A Project to Develop a Drug Information Service for the UBC
Health Centre and Other Hospitals in the Province of B.C.

(Mr. J.G. Moir)

Project in Facial Reconstructive Surgery on Prison Inmates a
Study of Social Vocational and Psychological Effects on
Recidivism

(Dr. A.M. Marcus)

The Effect of Exogenous Pancreatic Enzymes on Fat Absorption
and Protein Digestion and Absorption in Patients with Cystic
Fibrosis of the Pancreas

(Dr. M. Mullinger)

Biosyntheses in Developing Brain of Nucleic Acids-
Phospholipids and Enzymes

(Dr. J.S. Tyhurst)

Case Register Studies in the Epidemiology of Psychiatric
Disorders in Children (U. of B.C.)

(Hamish Nichol and Alex Richman)

The Investigation of the Fusional Characteristics, the
Prognosis and the Prevention of the Various Types of
Amblyopia ex Amopsia

(Dr. A.J. Elliot)

An Investigation of the Physiological and Psychological
Correlates of Psychopathic Behaviour

(R.D. Hare)

Computer-Based Data-Handling Techniques to Facilitate
Automation and Screening Programmes in Clinical Labs
(Mr. U.S. Sturdy)

A computerized Poison Control Information System
(Mr. J.G. Moir)

Research Position in Biometry for the Department of
Preventive Medicine, University of B.C.
(G.R.F. Elliott and Donald O. Anderson)

A Follow-up of Hospital Use by Psychiatric Patients
(Dr. J.S. Tyhurst)

Prevention of R.H. Immunization
(Dr. F.E. Bryans)

The Epidemiology of Trachoma Inclusion Conjunctivitis (Tric)
Agents in a Venereal Disease Clinic Population
(Dr. Denys K. Ford)

Amino Acidopathies in B.C.
(D.A. Applegarth)

Linguistic Evaluation of Free Speech Samples Obtained from
Aphasic Patients
(Otfried Spreen)

Further Development and Analysis of Psychometric Tests for
the Evaluation of Impairment in Brain-Damaged Patients
(Otfried Spreen)

Determination of an Efficient and Effective Means of
Detecting Visual Problems in Preschool Children
(L.D. Kornder, M.D.)

Diagnosis and Treatment of Disorders of Amino Acid
Metabolism in the Prevention of Mental Disease
(Dr. Thomas L. Perry)

Special Committee

An Investigation Into the "Generic Equivalency" of Commercial Preparations Containing Either Tetracycline HCL or Bishydroxycoumarine

(M. Pernerowski)

An Exploration of the Natural History of Drug Addiction

(Ingeborg Paulus)

A Study of Changes in Pattern of Care for Children in Hospital at the Health Centre for Children

(Dr. Sydney Israels)

Ecology of Human Arbovirus Infections in B.C.: A Pilot Study

(Dr. G. Donald Kettys)

A Survey of Opinions on Public Dental Programs (Nature, Relationships and Outlook)

(Harry Knowlton Brown)

Epidemiological Studies of Emergency Services for Children in the Vancouver General Hospital

(Geoffrey C. Robinson)

A Study of Communication About Disturbed Children Between Psychiatrist and School-Teachers in a Metropolitan Area

(Dr. A.N. McTaggart)

Study of Juvenile Delinquents Requiring to be Detained or to Appear in Court

(Hamish Nichol)

1) Juvenile Diabetic Retinopathy

2) Fluorescein Angiography

(Dr. A.J. Elliott)

Study of Traffic Accidents Resulting in Serious Injury
or Death Occurring in Urban Vancouver, with Particular
Reference to Relationship Between Apparent Cause of Accident,
Vehicle Design Factors, and Nature of Injuries Sustained
(G. Duncan McPherson, M.D.)

A Pilot Project to Devise and Test a Methodology to Appraise
the Caries Arrestment Properties of Four Solutions
(E.J. Hyde)

Gastroenteritis in Relation to Viral Infections
(Dr. Donald M. McLean)

Northwest Territories

Hydatid

(Dr. T.W.M. Cameron)

Special Committee

1. HEALTH SERVICES BRANCH

13.2.4.2.2

Smoking and Health A) Research Projects Completed

1. Surveys of Canadian Smoking Habits were carried out by the Dominion Bureau of Statistics for the Department of National Health and Welfare in August, 1964, September, 1965, and September, 1966. A similar survey is being made in September, 1967.
2. Teaching About Tobacco in Canadian Schools, mid 1964 by Dr. M.V. Marshal, Dean of Education, Acadia University, Wolfville, Nova Scotia.
3. Teachers' Habits and Attitudes Toward Smoking by Miss Vera M. Pezer, Research Psychologist, Psychological Research Centre, Saskatoon, Sask. Subjects under investigation included teachers attending Summer School (July 2 - August 12, 1964) at the University of Saskatchewan. The extent and kind of smoking was determined and related to several variables, for example age, sex, religion, urban or rural residence and others.
4. Personality Correlates of Cigarette Smoking by Dr. Herbert M. Lefcourt, Department of Psychology, University of Waterloo, Waterloo, Ontario. Measures of certain personality variables (internal versus external control, levelling versus sharpening) were obtained from all incoming freshmen at University of Waterloo. These measures depicted the degree to which people feel and act capable of securing desired goals.
5. A Comparison of Attitudes Toward the Effects of Smoking and Personality Variables of Smokers and Non-smokers in a Population of University Students by Dr. Paul H.D. Tacon, Assistant Professor of Psychology, University of New Brunswick, Fredericton, N.B. This study concerned an assessment of the attitudes toward smoking of over 2000 university students, both smokers and non-smokers. In addition an attempt was made to determine if personality differences exist between smokers and non-smokers.

6. Modification of an Overlearned Maladaptive Response through a Relearning Program by Dr. Neil McK. Agnew, Chief Research Psychologist, Psychological Research Centre, Saskatoon, Sask. This was a pilot project designed to estimate the effectiveness of an individualized relearning program in reducing the smoking habit.
7. A Survey of Changes in Smoking Habits combined with a Survey of Canadian Attitudes Regarding the Relationship between Cigarette Smoking and Disease by Canadian Facts, a private research organization between November, 1964, and January, 1965.
8. A Catalogue and Evaluation of Existing Educational Films and Filmstrip Aids Relating to Smoking and Health Hazards by the Metropolitan Educational Television Association, Toronto, Ontario.
9. A Survey of Cigarette Advertising by the Manitoba Educational Research Council, University of Manitoba, Winnipeg, Manitoba.
10. A Survey of Changes in Smoking Habits of Individuals by Canadian Facts, a private research organization, between November, 1965 and January, 1966.
11. A Review of Psycho-Social Factors in Cigarette Smoking by Dr. F.R. Wake, Department of Psychology, Carleton University, Ottawa, Ontario, 1965.
12. Some Determinants of Smoking Attitudes and Behaviour among High School Students by Dr. Marjorie N. Donald, Department of Psychology, Carleton University, Ottawa, Ontario. An investigation of changes over time in adolescent smoking patterns and the attitudes associated with them.
13. Longitudinal Study of Smoking Behaviour, Reaction to Frustration and Methods of Altering Smoking Involvement by Dr. Paul H.D. Tacon, Assistant Professor of Psychology, University of New Brunswick, Fredericton, New Brunswick. A study of changes in university students smoking habits over a one year period.

14. Methods Involved in Successful and Unsuccessful Attempts to Stop Smoking by Dr. F.R. Wake, Department of Psychology, Carleton University, Ottawa, Ontario.
15. Effects of Voluntary Control of the Autonomic Nervous System on the Smoking Habit by Dr. R.V. Thysell, Assistant Professor, Department of Psychology, University of Waterloo, Waterloo, Ontario. How to provide smokers with a simple technique for controlling the tension or drive state which may be assumed to be an immediate antecedent of the act of smoking.
16. An Evaluation of Educational Television Techniques in Teaching Smoking and Health by the Metropolitan Educational Television Association, Toronto, Ontario.

CURRENT SMOKING AND HEALTH RESEARCH PROJECTS

1. A Follow-Up of the May, 1960, Survey of Smoking Habits of Winnipeg School Children; of James B. Morison, M.D., by the City of Winnipeg Health Department.
2. A Study of the Effects of Health Education on Smoking Habits of Children and Student Nurses in Saskatoon; by V.L. Matthews, M.D., Professor and Head, Department of Social and Preventive Medicine, University of Saskatchewan.

This project is designed to develop techniques, and to determine the effects of health education in the prevention of cigarette smoking among children and student nurses.
3. Tar and Nicotine Research Project.

The objectives of this research are:
 - (1) To develop a surveillance system for determining levels of tar and nicotine and possibly other components of cigarette smoke which can be used as indicators of the hazardous elements in cigarette smoke.
 - (2) To ascertain the possibilities of removing specific harmful substances from cigarette tobaccos or smoke.
4. A Comparison of Various Behaviour Therapies on Addicted Cigarette Smokers. The purpose of this research is to validate results obtained by aversive conditioning (electric shock) and to produce an efficient simple treatment that can be used by any physician or physician's assistant to help a smoker reduce his habit.
5. A Smoking Withdrawal Study Centre by Dr. G.W.O. Moss, Deputy Medical Officer of Health, Toronto Health Department, Toronto, Ontario, and Dr. N.C. Delarue, Assistant Professor of Surgery, University of Toronto. This Centre assists adults to stop smoking and determines reasons for the successes or failures observed.

6. Methods Involved in Successful and Unsuccessful Attempts to Stop Smoking by Dr. F.R. Wake. Further processing of data obtained in 1966 as well as experimentation on methods of stopping smoking.
7. A Review of Psycho-Social Factors in Cigarette Smoking by Dr. F.R. Wake (updating of 1965 review).
8. A study to:
 - (a) Investigate the possibility of removing specific harmful substances from cigarette tobacco or its smoke;
and
 - (b) Develop techniques and standards appropriate to Canadian needs for use in a program of surveillance of levels of total tar and nicotine and possibly other indicators of the harmful constituents of cigarette smoke.by Dr. W.F. Forbes, Professor of Chemistry, University of Waterloo, Waterloo, Ontario.
9. A Survey to Determine the Extent of Exposure of Canadians to Cigarette Smoke Tar and Nicotine by Canadian Facts Limited, Toronto, Ontario.
10. A Nationwide Evaluation of Educational Television Techniques in Teaching Smoking and Health by the Metropolitan Educational Television Association, Toronto, Ontario.

WELFARE ASSISTANCE AND SERVICES BRANCH

13.2.4.2.3.

Welfare Research Projects Supported 1962 - 1967

Agency	Project Title	Year
New Projects 1962-63 (Total Expenditure \$29,813)		
N.B. Department of		
Youth and Welfare	Auxiliary Homes Project	1962-63, 1963-64
Ontario Department of		
Public Welfare	Family Demonstration	
	Project	1962-63
	Assessment and Rehabili-	
	tation Project for Older	
	Recipients of General	
	Welfare Assistance	1962-63
University of Toronto	Project on Social	
	Adjustment, Personality	
	and Behaviour in Ontario	
	Training Schools	1962-63, 1963-64
		1964-65
	Analysis of 1st Year	
	Field Instruction	
	Components and	
	Methodology	1962-63
	Historical and Classi-	
	fied Survey of Research	
	at the School of Social	
	Work	1962-63
Community Chest and		
Councils of Greater		
Vancouver	Area Development Project	1962-63, 1963-64,
		1964-65, 1965-66,
		1966-67, 1967-68

Special Committee

Agency	Project Title	Year
Canadian Welfare Council	Project on Utilization of Personnel	1962-63, 1963-64, 1964-65
New Projects 1963-64 (Total Expenditure \$57,952 - \$4,500 Refund = \$53,452)		
Nova Scotia Department of Public Welfare	Project on Family Structure and Health of Children	1963-64, 1964-65, 1965-66
Saskatchewan Department of Social Welfare and Rehab.	Prince Albert Social Aid Study	1963-64
British Columbia Department of Social Welfare	To Measure the Appropriateness and Effectiveness of Social Welfare Programs in the Local Community	1963-64
Y.W.C.A.	1963-64, Community Planning and Provision of Direct Service for Troubled Young Women; 1964-65, YWCA - Its Role in Relation to Serious Problems of Girls and Women	1963-64, 1964-65, 1965-66.

Agency	Project Title	Year
New Projects 1964-65 (Total Expenditure \$81,233)		
University of Toronto	The Voluntary Agency and Government: A Study of Public-Private Relationships in English-speaking Canada	1964-65, 1965-66, 1966-67, 1967-68
Manitoba Department of Welfare	Winnipeg Multi-Service Project: An Evaluation	1964-65, 1965-66, 1966-67, 1967-68
Saskatchewan Department of Social Welfare and Rehab.	Evaluation of Rehabilitation Procedures	1964-65
	Youths Committed to Correctional Institutions	1964-65
Canadian Welfare Council	School Performance in Public Assistance Families	1964-65
Canadian Conference on Children	Socio-Cultural Factors Affecting the Welfare of Children	1964-65
New Projects 1965-66 (Total Expenditure \$112,023)		
University of Toronto	Single Unemployed Men in Hamilton	1965-66, 1966-67
University of Ottawa	The Effect of Cultural Difference on the Provision and Outcome of Social Work Services	1965-66, 1966-67, 1967-68

Special Committee

Agency	Project Title	Year
Regina Welfare Council	A Community Study of Indians, Metis and Whites in Regina	1965-66
British Columbia Department of Welfare	Evaluation of Service to Social Allowance Recipients by the Nanaimo District Office	1965-66, 1966-67
Community Chests and Councils of Greater Vancouver	Study in Depth of Characteristics of Multi- Problem Families (Follow up to Area Development Project 559-21-1)	1965-66, 1966-67, 1967-68
Canadian Welfare Council	School Performance of Children of Public Assistance Families	1965-66, 1966-67
New Projects 1966-67 (Total Expenditure \$171,503)		
Nova Scotia Department of Welfare	Cape Breton County Welfare Services Study Lake Road Project Study of Social Service Department - Nova Scotia Hospital	1966-67 1966-67 1966-67
University of Ottawa	Development of Hypothesis on Similarities and Differences in Methods	1966-67

Agency	Project Title	Year
Carleton University	Relation between Parental Discipline and Physical Cruelty in Young Males	1966-67, 1967-68
Manitoba Department of Social Welfare	Social Service Audit of Metro Winnipeg	1966-67
Community Planning Council of Winnipeg	Assessment of Treatment Results in Six Residential Treatment Centres for Children in Manitoba	1966-67, 1967-68
Canadian Centre for Community Studies (University Campus - Saskatoon)	Study of the Possibilities for Co-ordinated Use of Resource Agencies in an Urban Redevelopment Area	1966-67, 1967-68
Family Service Association of Edmonton	An Evaluation of Radio as a Medium for Family Life Education and Crisis Intervention	1966-67
Simon Fraser University	A Critical Analysis of an Urban Community Development Project in Greater Vancouver	1966-67, 1967-68
Canadian Welfare Council	Employability and Public Welfare - An Assessment	1966-67, 1967-68

Special Committee

Agency	Project Title	Year
Canadian Welfare Council (Cont'd)	Study of Day Care of Children	1966-67, 1967-68
	Low Income Budgets and Consumer Behaviour	1966-67
	Study of Visiting Home-maker Services	1966-67, 1967-68
	The Incidence of Debt and the Need for Debt Counselling in Low Income Families	1966-67, 1967-68
National Committee on Canadian Schools of Social Work	A Study of Program Needs of National Committee of Canadian Schools of Social Work	1966-67
New Projects 1967-68 (Total Expenditure \$328,314)		
Dalhousie University	Description and Evaluation of the Relocation of Africville	1967-68
Family and Children's Services of Hants County	Community Care for the Elderly	1967-68
Mount Allison University	On the Relation between Anomie and Economic Change	1967-68
McGill University	Casework Performance Evaluation Study	1967-68
Service Social de Hull	Study for the Establishment of a Welfare Council for the Hull Region (\$9,453.61 approved)	--

Agency	Project Title	Year
Conseil Central des Oeuvres de Québec	Étude des Foyers Nourriciers et de leur population dans le diocèse de Québec	1967-68
	Étude des Institutions pour Personnes Agées et de leur population dans le diocèse de Québec	1967-68
Conseil Central des Oeuvres de Québec	Étude des Institutions pour Enfants et de leur population dans le diocèse de Québec	1967-68
Centre for Human Relations and Community Studies - Sir George Williams University	Group Guidance for Disadvantaged Inner City Youth	1967-68
University of Toronto	Evaluation of New Tech- niques of Treatment for Young Children and Women Offenders	1967-68
	Examining Dimensions of Organizational Behaviour	1967-68
Social Planning Council of Metropolitan Toronto	Social Development Planning Project	1967-68

Special Committee

Agency	Project Title	Year
Department of Reform Institutions	Evaluation of Detached Worker Program for Delinquent Boys	1967-68
Children's Aid Society of London, Ontario	Study of Parents Seeking Divorce in Middlesex County	1967-68
Big Brothers of Metropolitan Toronto	An Experimental Study of Services for Fatherless Boys	1967-68
Social Planning and Research Council of Hamilton and Dist.	The Effects of the Aging Process	1967-68
Manitoba Department of Welfare	A Survey of the Aged and Adult Infirm Foster Family Care Program	1967-68
Saskatoon Welfare Council	Factors which Contribute to the Social and Economic Independence of People over 60	1967-68
University of Alberta - Department of Sociology	Implications of Opportuni- ties for Youth Project	1967-68

Agency	Project Title	Year
University of Calgary	Use of Closed Circuit Television in Family Counselling (\$2,500 approved)	--
Children's Aid Society of Vancouver	Use of Welfare Aides in CAS of Vancouver	1967-68
University of British Columbia	Factors in Social Work Competencies	1967-68
Simon Fraser University	North Vancouver Adolescent Study	1967-68
Canadian Welfare Council	Social Policy Implica- tions of the Unmarried Parent	1967-68
Commission on Emotional and Learning Disorders in Children	Working Documents for the Commission	1967-68
Canadian Centre for Community Studies	Identifying Key Para- meters of Rural, non-Farm Poverty	1967-68

Special Committee

Demonstration Projects Supported Under National Welfare Grants
 Since April 1, 1966

Project Title

1966/67

Three Mile & Five Mile Plains Area	1966-67, 1967-68
Burlington Social Services Centre	1966-67, 1967-68
Neighbourhood Service Unit - St. James Town	
Project	1966-67, 1967-68
Prince Albert Social Aid Rehabilitation Project	1966-67, 1967-68
Local Area Approach - Vancouver Community	
Chest and Councils	1966-67, 1967-68
Area Development Project - Vancouver, B.C.	1966-67, 1967-68
P.E.I. Half Way House & Alcoholic Treatment	
Centre	1966-67, 1967-68
Halifax Neighbourhood Centre Project	1966-67, 1967-68
Credit Counselling Service of Metro. Toronto	1966-67, 1967-68
Special Adoption Unit to place Indian	
and Metis Children	1966-67, 1967-68
Project 66 - To define & analyze the	
provincial departments re (1) services &	
policies, (2) staff training, (3) information	
handling processes	1966-67, 1967-68
After Care Project - Brannan Lake School for	
Boys and Willingdon School for Girls	1966-67, 1967-68

1967/68

Foster Home Finder Catholic Charities	1967-68
Hamilton Y.M.C.A. Unemployed Youth Project	1967-68
Use of Electronic Data Processing & System	
Analysis re Child Placement	1967-68
Urban Renewal Services	1967-68
Employment of Indigenous Workers as Welfare	
Fieldmen	1967-68
Resource Mobilization for Employment	1967-68, 1968-69
Community Organization Survey and Development	
Project	1967-68

13.2.4.2.4

FITNESS AND AMATEUR SPORTS RESEARCH PROJECTS SUPPORTED

1962-1963

Title of Project

An experimental sports fitness training school for young boys
To study physical fitness changes relative to sex, age and
intensity of physical activity in similar groups of people partici-
pating in ice hockey, curling, alley bowling, skiing and figure
skating

The comparative effects of training in various sports as measured
by a treadmill performance test and certain physical measures

1963-1964

Title of Project

Renewal: An experimental sports fitness training school for young
boys

Renewal: To study physical fitness changes relative to sex, age,
and intensity of physical activity in similar groups of people
participating in ice hockey, curling, alley bowling, skiing, and
figure skating

Study of respiratory rate and ventilation volume during sports
performance using radio-telemetry

Relationship of range of motion of major articulation for different
types of sports skills

Study of related growth and development factors in athletic performance

Effect of training in various sports on Balke performance treadmill
test

The development of physical performance test norms for Canadian boys
and girls

1964-1965

Title of Project

A study of the relationship of ventilation volume to respiratory
frequency, heart-rate, and body temperature during an all-out mile
run on the track as monitored by radio telemetry

Special Committee

The relationship of "fitness" to the factors limiting physical performance

Phase plane analysis of arterial pressure curves in various degrees of physical fitness

Application of bicycle ergometer studies in children

An experimental sports-fitness training school for young boys

The influence of intensity, duration and frequency of running on endurance fitness in man

Physical performance test norms for children

Studies in aerobic and anaerobic metabolism during exercise, before and after physical training

Study of related growth and development factors in athletic performance

The relationship between psychological and physical fitness research
A literature survey

The effects of training and sports on treadmill-performances

The telemetred heart rate during interval training in swimming

Individual Research Projects plus carry-over from 1963-64:

Doroschuk - Experimental Sports Fitness Training School

Metivier - U. of Ottawa Physical Fitness changes relative to sex, age and intensity of physical activity

Research Units:

University of Alberta

University of Montreal

1965-1966

Title of Project

A study of physiological function in unrestrained athletes by means of a four-channel radio telemetry system

Pulse wave time derivatives and urinary catecholamine secretion levels associated with physical condition and changes in these parameters attendant upon systematic training

The relationship of "fitness" to the factors limiting physical performance

The influence of intensity, duration, and frequency of treadmill exercise on endurance fitness in man

Analysis of the peripheral pulse and its first and second derivatives with emphasis on display in the phase-plane

The application of bicycle ergometer studies in children

Coronary Heart Disease in French-Canadian families

A study of the relationship between fitness and ageing, of the significance of these relationships for well-being in the later years and of their implications for the development of sound community programs for the elderly

Physical Performance Test Norms for Children (CAHPER)

The development of national norms of work capacity (CAHPER)

Quantitative strength changes following isometric programs of varied intensity

Studies in aerobic and anaerobic metabolism during exercise, before and after physical training

The relationship of individual differences in motor skill learning at ages 5 to 12 years

A study of related growth and development factors in athletic performance

The effects of a 20-week exercise program on post-infarct and clinically healthy males

The psychological and social factors in physical fitness and athletic performance

The Energy Expenditure of Drownproofing

Research Projects:

Unit

University of Alberta

University of Toronto (purchase of special equipment)

University of Montreal

Total - 3 Units:

1966-1967

Title of Project

The Validity of sub-maximal tests for the measurement of maximal cardio-respiratory capacity

The effect of low oxygen tensions on acid base balance and work capacity and the role of frequency of exposure in acquired tolerance (cont'g.)

Comparative investigation of strength training methods for leg extensor muscles

The relationship of "fitness" to the factors limiting physical performance (cont'g.)

Analysis of the peripheral pulse and its first and second derivatives with emphasis on display in the phase-plane

The longitudinal effects of a programme emphasizing the problems solving method of teaching physical education in the elementary school (cont'g.)

The inter-relationship of selected cardiovascular fitness tests in university women

Bicycle ergometer studies in children (cont'g.)

Recreation and training: characteristics of adult men indulging regularly in sports or in a physical exercise program (cont'g.)

The development of national norms of work capacity (CAHPER) (cont'g.)

Quantitative strength changes following isometric programs of varied intensity

Oxygen debt, cardiac output and peripheral blood flow during exercise, before and after physical training

Study of related growth and development factors in fitness and athletic performance (cont'g.)

Investigation of the last portion of the forced vital capacity in athletic subjects

The effects of a 24-week graduated exercise program on clinically healthy and post-infarct males (cont'g.)

The influence of intensity, duration, and frequency of treadmill exercise on endurance fitness in man (cont'g.)

Social and task induced motivation (cont'g.)

Relationship of selected physical and motor growth factors of boys and girls ages 4-10 years

University of Alberta + special equipment grant (returned \$41.03 June /67)

University of Toronto + analogue computer (returned \$242.03 May /67)

University of Montreal (returned \$3,135.71 unexpended balance May, 1967)

1967-1968

Title of Project

The Effects of Athletic Training on Performance in the Young and Old

The Effects of a Systematic Physical Education Program on the Motor and Academic Performance of Educable Mentally Retarded Prepubescent Children

The Saskatchewan Growth and Development Study

Altitude Acclimatization by Low Oxygen Tension Atmosphere Exposures

An Examination of the Qualitative Response of Selected Cardio Pulmonary Variables to Exercise

Étude sur la fréquence, l'intensité et la durée de programmes minima de conditionnement physique et leurs effets sur la capacité au travail de jeunes adultes

The Longitudinal Effects of a Programme Emphasizing the Problems Solving Method of Teaching Physical Education in the Elementary Schools

The Inter-relationship of Selected Cardiovascular Fitness Tests in University Women

Population Studies of Working Capacity

IBP - Nation-wide Study of Fitness Level of Canadian Athletes of International Calibre

Recreation and Training: Characteristics of Adult Men Indulging Regularly in Sports or in a Physical Exercise Program

The Measurement of Attitude of Camp Leaders with a View of Improving Staff Selection and Training

The CAHPER Work Capacity Study (Total CAHPER 4 years = \$93,584.46) completed

A Study of Factors for the Promotion and Development of Participation in a Specific Activity - Volleyball

The Submaximum Work Capacity and its Predictability in the Middle-aged Canadians

Territorial Experimental Training Program

Investigation of the last portion of the forced vital capacity in athletic subjects

The Effects of a 24-Week Graduated Exercise Program on Clinically Healthy and Post-Infarct Males

Acute Suppleness Changes Accompanying Exercise of Middle-Aged Males

The Respective Roles of Motivation, Aerobic and Anaerobic Metabolism in Endurance Fitness

IBP Project - International Working Party for Standardization of Methods of Measuring Work Capacity

Effect of Concentric, Eccentric and Isometric Training of Leg Extensors
Social and Task induced Motivation

An Electrogoniometric Study of Athletes in Motion

Relationship of Selected physical and motor growth factors of boys and girls ages 4-10 years

13.2.4.3

Introduction

The ANNEX, Volume II, contains selected case examples of projects undertaken in various branches of our Department. We have not chosen these necessarily as the best examples, instead they are representative, indicating in some instances the difficulties involved in reaching objectives when complex human behaviour and various publics are involved, e.g. the Smoking and Health Program, for which we have included a cost benefit analysis. In another instance, several breakthroughs in our Laboratory of Hygiene are cited, in still another instance we note the impact on the Canadian drug market, protection of Canadians and the international recognition arising out of scientific activities in our Food and Drug Directorate. While a proper evaluative review of the benefits and impact of twenty years of the National Health Grants still awaits a systematic study in our department,¹ in this Brief we have selected one program, namely, Organized Home Care, because we believe that the Grants played a major role in enabling the provinces, the voluntary agencies ready to undertake new responsibilities (mainly V.C.N.) in the organization of health care, and the pioneering physicians and health teams to experiment with a new delivery of care service. Organized Home Care is now a legitimate service; it is not confined to hospital patients or to medical indigents but has survived its development phase in the spectrum of health care services and in doing so established pioneer community health teams. Finally we cite briefly an example in Development, relating to prosthetic service.

¹ For publications reviewing the accomplishments of the National Health Grants Program see: National Health Grants, 1948-1961, the Department, Jan. 1962.

D.M. Herron, B.A., M.P.H., "National Health Grants", Medical Services Journal, Canada, XXIII:9, Oct., 1967.

13.2.4.3 Selected Case Histories13.2.4.3.1 The Food and Drug Directorate.- Impact of its Scientific Activities

The scientific activities and research output of the Directorate have a marked impact on Canadian economic development. The Food and Drugs Act gives the Directorate very broad regulatory powers over the food and drug industries. By virtue of its responsibility to ensure that drug manufacturers submit satisfactory new drug submissions, for example, the Directorate effectively determines which drugs appear on the Canadian market. Similarly, pesticides and food additives may not be sold without the Directorate's consent. The Act and regulations also set standards for food composition, food and drug manufacturing facilities and hygiene and cleanliness in the food and drug industries. They control labelling and packaging of foods, drugs, cosmetics and medical devices. Sale of certain drugs is prohibited and that of many others is regulated. A Food and Drug Inspector may at any reasonable time "enter any place where on reasonable grounds he believes any article to which this Act or the regulations apply is manufactured, prepared, preserved, packaged or stored, examine any such article and take samples thereof, and examine anything that he reasonably believes is used or capable of being used for such manufacture, preparation, preservation, packaging or storing." In addition he may "open and examine any receptacle or package ——— he believes contains any article to which this Act or the regulations apply", examine "any books, documents or other records ——— he believes contain information relevant to the enforcement of this Act", and "seize and detain for such time as may be necessary any article by means of or in relation to which he reasonably believes any provision of this Act or the regulations have been violated."

The above-mentioned powers of the Directorate, by requiring the food and drug industries to meet specified standards, obviously influence the amount of money which these industries expend annually.

On the other side of the coin, however, they protect consumers against serious health hazards and protect industry and consumers against incalculable economic losses. Directly or indirectly, therefore, the activities of the Directorate affect the lives of all Canadians and influence every sector of the Canadian economy. The research output of the Directorate also has had a measurable effect on the advancement of scientific knowledge. Directorate scientists are recognized as world authorities in a number of fields. These include the following.

(a) Food Microbiology

The activities of the Microbiology Division of the Research Laboratories have received international acclaim. The Chief of the Division, Dr. F. S. Thatcher, recently was awarded the 1968 Fred S. Tanner Award of the Institute of Food Technology for "his superior achievements in the science of microbiology and his pre-eminent leadership in furthering our knowledge of microorganisms of public health significance."

(b) Drug Availability

During the early 1950's, workers in the Research Laboratories of the Directorate pioneered the concept that all dosage forms of a drug may not produce equal therapeutic effects in the body. The importance of this work now is widely recognized, as witness the current controversy over "generic" versus "brand name" drugs.

(c) Protein Nutrition

Our staff have made internationally recognized contributions in this field. Dr. A. B. Morrison's 1963 Borden Award of the Nutrition Society of Canada and Dr. J. A. Campbell's 1966 Wiley Award of the Association of Official Analytical Chemists were made in part in recognition of the protein studies conducted in the Directorate. Further recognition of the status of the laboratory in this field is provided by the fact that the United Nations Children's Fund (UNICEF) has provided a fellowship tenable in the Nutrition Division of Research Laboratories for training scientists from underdeveloped countries.

(d) Pesticide Analysis

Under the direction of Dr. W. P. McKinley, former Chief of the Food Division of Research Laboratories, the pesticide section of Food Division developed an international reputation in the area of pesticide methodology. Extremely sophisticated procedures have been developed for analysis of many pesticides in food samples. One of our major contributions has been to develop rapid screening methods of wide applicability, which can simultaneously detect up to over 50 pesticides in a single sample.

(e) Essential Oils

Dr. L. Levi, former Chief of the Pharmaceutical Chemistry Division, along with the late Dr. I. C. Nigam, have received wide acclaim for their research on the components of complex essential oils.

(f) Narcotics Identification

Staff of our Pharmaceutical Chemistry Division have been very active in the area of narcotic identification, and this work has been widely quoted by international agencies and researchers in the field.

(g) Toxicology

The Toxicology and Pathology Section of Pharmacology Division is widely known for its work on cobalt toxicity, food colors and food antioxidants.

(h) Analysis of Active Principles in Thyroid Powder

Dr. N. R. Stephenson developed a novel and very valuable procedure for analyzing thyroid powder which explained the lack of clinical effect of certain desiccated thyroid products. This paper has received wide attention and acclaim.

13.2.4.3.1.1

RESEARCH PROJECTS - RESEARCH LABORATORIES 1968-69Nutrition Research Division

<u>No.</u>	<u>Project</u>	<u>Leader</u>	<u>Man Years 1968-69</u>
N.001	Nutritional effects of the nitrate-nitrite content of foods	Phillips	0.1 P
N.002	Vitamin A and its role in the body	Phillips	1 P 0.5 T
N.003	Nonsaponifiable constituents of human tissue	Phillips	1.5 P 1.5 T
N.004	Fatty acids and phospholipids	Beare-Rogers	0.75 P 0.75 T
N.005	Effect of oral contraceptives on pyridoxine metabolism	Beare-Rogers	0.25 P 0.25 T
N.006	Chemical and biological studies of vitamin D	Panalaks	1 P 1 T
N.007	Metabolic studies on ascorbic acid	Pelletier	0.75 P 0.75 T
N.008	Prediction of stability of vitamin products	Pelletier	1.1 P
N.009	Calcium and phosphorus metabolism	Shah	0.5 P
N.010	Protein-nutrient interrelationships	Knipfel	0.5 P 0.5 T
N.011	Evaluation of proteins	McLaughlan	0.75 P 0.75 T
N.012	Drug-nutrient interactions in microorganisms and animals	Rogers	1 P 1 T
N.013	A collaborative investigation of procedures used in amino acid analysis of biological fluids and protein hydrolyzates	Knipfel	0.1 P
N.014	Availability of zinc in oysters	Shah	0.75 P

* P = Professional

* T = Technical

Special Committee

<u>Food Division</u>			<u>Man Years</u>
<u>No.</u>	<u>Project</u>	<u>Leader</u>	<u>1968-69</u>
F.001	The application of glycoprotein characteristics to the identification of plant and animal tissues used in meat preparations	Kamm	0.3 P 1.0 T
F.002	The identification and quantitation of the materials contributing to the protein content of meat products	Kamm	0.6 P 1 T
F.003	The chemical composition of fruit juices and the development of indices for the identification and measurement of fruit juice content	Coffin	0.65 P 0.6 T
F.004	Development of a scheme of analysis for emulsifiers	Sahasrabudhe	0.3 P 0.7 T
F.005	Methods for polynuclear hydrocarbons in smoke flavoured foods	Gunner	0.1 P 0.5 T
F.007	A general screening methods with confirmation procedures for determining pesticide residues in samples of plant or animal origin	McLeod	0.5 P 1 T
F.008	A study of detectors for pesticides resolved by gas liquid chromatographic techniques	McLeod	0.5 P 0.5 T
F.009	Morphological and physiological responses of selected fungi to various pesticides	Wales	0.5 P
F.010	Organophosphorus Pesticides: Methods of determination, metabolism and effect of irradiation	Grant	1 P 0.5 T
F.011	Metabolism of organochlorine pesticides and the development of methods for determining residues of these compounds	McCully	0.2 P 1 T

<u>No.</u>	<u>Project</u>	<u>Leader</u>	<u>Man Years</u> <u>1968-69</u>
F.012	The biological assay of toxic residues in food materials	Abedi	1 P 1 T
F.013	A study of the effect of organo-phosphorus pesticides on enzyme systems	Villeneuve	1 P 0.7 T
F.015	A scheme of analyses for the rapid determination of trace quantities of metals in foods	Meranger	1 T
F.016	The characterization of toxic compounds of fungal origin, and their analysis in foodstuffs	Scott	1 P 1 T
F.017	Chemical indices for detection of filth and insects in foods	Sen	0.5 P 0.8 T
F.018	Nitrosamines and other carcinogenic nitroso compounds in foods	Sen	0.5 P
F.019	Metabolism of fungicides in foodstuffs	Somers	0.5 P 0.5 T
F.020	Studies on flavouring agents and flavour enhancers: II. Common flavours containing a methylene-dioxy group	Gunner	1 P 1 T
F.021	Biochemical reactions of fungal toxins	Somers	1 P 0.5 T
F.023	Methods of analysis for food colours	Sahasrabudhe	0.05 P 0.1 T
F.024	A general scheme for the detection and estimation of residual solvents in foods and food ingredients by gas liquid chromatography	Sahasrabudhe	0.2 P 0.1 T
F.025	Detection and estimation of brominated oils in fruit drinks	Sahasrabudhe	0.05 P 0.1 T

Special Committee

<u>No.</u>	<u>Project</u>	<u>Leader</u>	<u>Man Years</u> <u>1968-69</u>
F.026	Detection of adulteration and substitution in fats and oils	Sahasrabudhe	0.15 P 0.2 T
	a. olive oil		
	b. butter fat		
	c. margarines and shortenings		
F.027	Esterases in relation to their interaction with pesticides commonly applied to foodstuffs	Mendoza	1 P 0.3 T
F.028	The chemical composition of jams, jellies, marmalades, preserves and the development of indices for the identification and measurement of fruit content	Fuleki	1 P
<u>Microbiology Division</u>			
M.001	Development of modified toxins or virulence by irradiated bacteria	Erdman	0.6 P 0.6 T
M.002	Identification of <u>C. botulinum</u> cultures by serological procedures	Erdman	0.25 P 0.50 T
M.004	The determination of staphylococcus enterotoxin A	Dickie	1 P 1 T
M.005	The isolation and characterization of an emetic principle from malted milk powder	Dickie	1 P 0.5 T
M.006	Changes in DNA in irradiation-resistant <u>E. coli</u>	Stavric	1 P 0.5 T
M.008	A rationale for the requirement of uracil and arginine by a radiation resistant organism	Robern	0.4 P 0.2 T
M.009	Enzymes involved in the synthesis of RNA and protein in normal and radiation-resistant <u>E. coli</u>	Robern	0.5 P 0.5 T

<u>No.</u>	<u>Project</u>	<u>Leader</u>	<u>Man Years</u> <u>1968-69</u>
M.010	A comparative cytological study of normal and irradiation-resistant bacterial mutants using the electron microscope	Pontefract	0.7 P 0.3 T
M.012	Improved specificity of procedures for detection of <u>C. botulinum</u> using fluorescent labelled antibodies	Pontefract	0.3 P
M.013	Enzymological studies in relation to Johnston <u>Salmonella</u> isolation procedures		0.25 P
M.014	The interaction of sodium chloride, Pivnick sodium nitrite and pH on destruction of spores of <u>Clostridium botulinum</u> during thermal processing and on out-growth of spores after thermal processing		0.6 P 1.0 T
M.016	The cause of food poisoning induced by <u>Clostridium perfringens</u>	Hauschild	0.6 P 0.6 T
M.017	The determination of the ability of food-borne fungi to produce aflatoxins ochratoxin A and other toxic metabolites	Van Walbeek	1 P 1 T
M.018	Formation and alterations of botulinal toxins	Hauschild	0.4 P 0.4 T
M.020	Collaborative assay, various methods for food microbiology, including specific tests for pathogens in foods	Erdman	0.4 P 0.1 T
M.022	Serological detection of staphylococcal enterotoxins. Collaborative assay of U.S.F.D.A. procedure	Erdman	0.5 P

Special Committee

<u>No.</u>	<u>Project</u>	<u>Leader</u>	<u>Man Years</u> <u>1968-69</u>
<u>Pharmaceutical Chemistry Division</u>			
PC.006	Dissolution rate studies	Cook	1 P 1 T
PC.007	Infrared spectroscopic studies on drugs and drug interactions	Cook	0.25 P 1 T
PC.009	NMR studies of drugs (and related chemicals), drug interactions and drug analysis	Cook - Neville	1.5 P 1 T
PC.010	Detection of impurities in bulk drugs	McGilveray	0.3 P 0.7 T
PC.011	The estimation of drugs and their metabolites in biological fluids	Mattok	0.9 P 1 T
PC.012	Qualitative and quantitative methods for analysis of antibiotics	McGilveray	0.3 P 0.3 T
PC.013	Toxic plants and related substances	Genest	0.5 P 0.75 T
PC.014	Analysis of pharmaceutical preparations containing natural products	Hughes	2.75 P 0.75 T
PC.015	Pharmacognosy of drug plants used in pharmaceutical preparations	Nigam	1.75 P 0.5 T
PC.016	Examination of narcotics, controlled drugs and other drugs subject to abuse	Beckstead	1 T
PC.017	Analytical criteria of pharmaceutical quality control	Watson	1 P 1 T
PC.018	Qualitative and quantitative methods for analysis of pharmaceutical dosage forms	French	4 P
PC.019	Stability of drugs and pharmaceuticals	Smith	1.5 P 1.5 T
PC.036	The development of analytical procedures for steroids	Lodge	1 P

<u>No.</u>	<u>Project</u>	<u>Leader</u>	<u>Man Years</u> <u>1968-69</u>
<u>Pharmacology Division</u>			
P.001	The relationship between molecular structure and biological activity of steroid hormones	Liston	2 P 1 T
P.002	Immunoassay of human gonadotropins	Mori	1 P 1 T
P.004	Labelled progestational steroids and their mechanism of action. I. Synthesis of 4- ¹⁴ C-17 α -Ethinyl-19-nortestosterone	Layne	1.5 P 0.5 T
P.006	Influence of the limbic system over pituitary-adrenal function I: Effect of chlordiazepoxide II: Effect of barbiturates	Usher	1 P 1 T
P.008	Blood cholinesterase levels and drug activity	Bhatnagar	1 P 1 T
P.012	Physiological availability of drugs in various oral dosage forms	Van Petten	0.5 P 2 T
P.013	Modifying factors in chemical carcinogenesis. Age and carcinogenesis.	Grice	0.1 P
P.014	Carcinogenicity of placental and milk transferred aflatoxin metabolites	Grice	0.5 T 0.5 P
P.015	Toxicity and carcinogenicity of food colours a. Biochemical studies with blue VRS b. Carcinogenicity of triphenyl methane dyes	Grice- Becking	0.3 P
P.016	Teratogenic and toxic effects of food additives and drugs	Khera	1 P 1 T
P.017	Interactions between alcohol and other drugs	Coldwell	1.5 P 0.5 T

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<u>No.</u>	<u>Project</u>	<u>Leader</u>	<u>Man Years</u> <u>1968-69</u>
P.018	Cobalt Metabolism	Wiberg	0.75 P
	a. Biochemical aspects		
	b. Studies on cobalt toxicity		
	c. Electron microscopic changes induced by cobalt		
P.021	Effects of Diet on drug response	Becking	0.75 P 1 T
P.022	The mechanism of action and metabolic fate of DDA, the principal urinary metabolite of DDT	Johnson	0.5 P 0.5 T
P.024	The metabolism of drugs by the human placenta	Van Petten	1.25 P 0.5 T
P.025	Conjugation and detoxification of steroids	Collins	1.5 P 1 T
P.026	Investigations relating to incom- patibility between Hexamethylene- tetramine (Methenamine) and various drugs	Johnson	0.5 P 0.5 T
P.027	Drug induced chromosomal aberrations	Goodman	1 P
P.029	Inhibition of uricase in vivo	Johnson	0.5 P 0.5 T
P.032	Perinatal pharmacology	Willes	1.5 P 1.5 T
P.033	Evaluation of behavioural tests with Elliott respect to their specificity to drug effects in animals and their predictive value of drug effects in man		1.5 P
P.034	Effect of nicotinic acid and its derivatives and analogues on pituitary-adrenal activity in animals and man	Johnson	1 P 1 T

<u>No.</u>	<u>Project</u>	<u>Leader</u>	<u>Man Years</u> <u>1968-69</u>
P.035	Anti-folic activity of drugs, with particular attention to pyridium and pteridine diuretics	Johnson	0.5 P 0.5 T
P.037	The role of N-acetyl aspartic acid in the central nervous system	Burba	0.5 P
P.038	Interaction between drugs: Effect of administration of β -blocking agents during blockade by α -adrenergic blocking agents	Kohli	1 P 1 T
P.039	Pharmacological and behavioural effects of nutmeg	Elliott	0.25 P 0.25 T

13.2.4.3.1.2

Report on Selected Work of Research Laboratories
January 1 - December 31, 1967.

Pharmacology Division

(a) Toxicology

1. In the rat, cobalt caused marked changes in the heart muscle, characterized by an accumulation of fluid between muscle fibres, fragmentation of muscle fibres, accumulation of fat in myocardial cells, and ultimate death of some fibres. Biochemical studies indicated that cobalt reduced the ability of heart muscle cells to utilize oxygen, by blocking fatty acid metabolism. Cobalt decreased the contractility of isolated rat heart without depressing high energy phosphate levels while the increased contractility produced by nor-adrenaline was followed by a decrease in high energy phosphate levels.
2. Chick embryos were found to be very sensitive to the toxic effects of organophosphorus pesticides; injected into the egg on the tenth day of incubation. The lesions produced included curvature of the spine and abnormalities of the skull.
3. When acetylsalicylic acid and barbiturates were given in combination to rats, they were more toxic than when given alone. The animals given the combination of the two drugs had higher total and free plasma and brain salicylate levels than those given acetylsalicylic acid without barbiturate.

(b) Enzymes

1. Serum cholinesterase levels in the rabbit were significantly reduced following hemorrhage. Preliminary results indicated that hemorrhage also caused reduction of serum cholinesterase levels in human subjects.
2. Allopurinol (4-hydroxypyrazolo-3,4-d) pyrimidine a drug used in the treatment of gout, was found to be

a potent inhibitor of the enzyme tryptophan pyrrolase. Plasma tryptophan levels in rats, however, were unaltered by Allopurinol administration. A number of triazine derivatives have been found to act as potent uricase inhibitors.

(c) Drug Metabolism

1. The urinary antiseptic Methenamine (hexamethylenetetramine) was found to break down to a considerable extent when added to homogenates of liver, kidney and brain tissue at physiological pH values. When Methenamine was given orally to rats, free formaldehyde was detected in various tissues.
2. A rapid and sensitive method was developed for the determination of dichlorodiphenylacetic acid (DDA), the principal urinary metabolite of DDT in mammals.
3. Zinc deficiency markedly reduced hepatic drug metabolizing enzyme activities in the rat.

(d) Protein Hormones

1. An antiserum was prepared from rabbits which is apparently specific for follicle stimulating hormone, (FSH). The antiserum has been used in development of a sensitive analytical method for determining human urinary FSH and is now being applied to immunoassay of human pituitary FSH.

(e) Perinatal Pharmacology

1. Excellent progress is being made in utilization of a specialized surgical technique for studies on perinatal pharmacology. Briefly, the procedure involves cannulization of the saphenous vein and femoral artery of the unborn lamb, with provision for monitoring of blood pressure and removal of blood samples during the last 20-30 days of fetal life. Preliminary investigations suggest that the fetal lamb does not possess adult levels of the enzymes involved in

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catecholamine metabolism. Propanolol blocked the action of isoproterenol for 15-24 hours in the unborn lamb, but only for 90 minutes in the mother.

2. Investigation of the drug-metabolizing activity of human placental tissue indicated that the placenta can metabolize barbiturates and amphetamine at significant rates. It thus serves as an important mechanism for maintenance of homeostasis in the fetus.

(f) Mutagenic Effects of Drugs

1. Work is beginning on mutagenic effects of drugs, including STP, LSD and other hallucinogens. Human cell lines are presently being established, and human leucocyte techniques have been set up.

(g) Physiological Availability

The availability to the body of ASA given orally or rectally was determined in prison volunteers. No significant differences were observed in the peak or duration of blood salicylate levels after ASA was given as a fast-dissolving tablet or as a rectal suppository.

II. Pharmaceutical Chemistry Division

(a) Dissolution Studies

1. Four uncoated PAS formulations were tested in vivo and in vitro. All were found about equally available (84-99%). In vitro data (dissolution or disintegration time) did not, however, correlate with in vivo results. One sustained action and one enteric coated preparation were only partially available (42 and 57%).
2. A large scale study was made of the dissolution rate of trifluoperazine tablets from four national manufacturers. T_{50} values ranged from a few minutes to over one hour. Extensive studies are underway to develop an analytical procedure for determining

trifluoperazine and its metabolites in blood and urine.

3. Dissolution rate tests have been carried out on twelve different brands of chloramphenicol capsules. The USP XVII disintegration test was used and one 250 mg. capsule examined at a time (no disk or plunger) in USP XVII simulated gastric fluid (no enzyme). The majority of the products tested gave adequate dissolution rates, but two lots showed very poor dissolution characteristics. Most, but not all, of the products contained lactose as filler (identified by infra-red spectroscopy).
4. The dissolution rates of all available phenylbutazone sugar-coated tablets have been measured by several methods. Wide variations in rate occur in these products. These results will be of value in correlating with physiological availability when in vivo studies are done.

(b) Drug Purity and Potency

1. Samples of the anesthetic Halothane produced by two manufacturers were examined by gas chromatography following reports that adverse reactions observed may have been due to the presence of toxic fluorinated hydrocarbons. Investigations showed the presence of at least eleven impurities, but in trace quantities only (total less than 0.1%). The amount was considerably below that reported for products manufactured several years ago. The observation reflects an increase in the quality control presently exercised by the manufacturers.
2. Infra-red studies on mixtures of xanthines with salicylic acid have revealed the presence of intramolecular complexes, but no true salts. The existence

of these complexes may account for the increased absorption of salicylic acid when administered to animals in conjunction with caffeine. Similarly mixtures of xanthines and barbituric acids probably also involve such complexes. With the strong quinine type bases, true salts can be formed.

3. Studies were conducted on the content uniformity of various brands of trifluoperazine tablets marketed in Canada in order to gather data indicative of the extent of pharmaceutical quality control exercised by different manufacturers. Drug content variations ranged from excellent (individual tablet standard deviations of about 1.5%) to most unsatisfactory (individual tablet standard deviation of about 11.2%).
4. A sensitive assay has been developed for pharmaceutical preparations containing phenylbutazone. It is applicable to dosage forms containing antacids (alka-preparations) and dyes which interfere in pharmacopoeial methods. Marked degradation of the drug occurs in alka-preparations and no less than five different decomposition products have been found to be present in some of these dosage forms. The total amount of the degradation products can be determined by the assay procedure developed and the amount of each estimated by means of TLC.

(c) Bulk Drugs

1. In a continuation of studies on the quality of bulk drugs, seven samples of chlorpromazine and trifluoperazine were examined by thin layer and gas chromatography. Two specimens of each drug were found to contain trace amounts of impurities - tentatively identified as trifluoromethylphenothiazine and analogues. No significant impurities were found in several bulk samples of two phenothiazines and several antibiotics.

(d) Natural Products

1. A thorough chromatographic investigation has been made of the leaves of *Peumus boldus*, used widely in the preparation of proprietary or patent medicines. Seventeen alkaloids were detected by TLC. Three of these have been isolated and shown to be (+) reticuline - a minor opium alkaloid, isoboldine, laiotetanine and lauriltsine.
2. The tropane alkaloids atropine, cocaine, ergonine, scopolamine and homatropine were subjected to reaction gas chromatography, and the identities of characteristic fragmentation products established.

(e) Narcotics and Hallucinogens

1. Improvements have been made in TLC analytical methods for marihuana, to increase specificity and selectivity in identification of the active constituents by using different solvents and thicker layers.
2. Methods have been developed for the identification of STP (4-methyl-2, 5-dimethoxyamphetamine) in the presence of related sympathomimetics and hallucinogens, based on thin layer, gas and reaction chromatography. The techniques have been successfully applied to two seizures containing STP, and have been sent to Regional Laboratories.
3. A collaborative study, conducted under W.H.O. auspices, for the analysis of morphine in opium has been completed. The method, a gravimetric one based on conversion of the alkaloid to the dinitrophenylether following its separation on a celite column, has been applied successfully to five U.N. samples of different geographical origins. It is distinctly superior to existing official procedures.

III. Food Division

(a) Pesticides

1. A scheme of analyses applicable to a variety of foods

and capable of measuring simultaneously 42 pesticides is ready for use. The 42 pesticides include most of the organochlorine type insecticides and organophosphorus type insecticides or miticides, plus some carbamates. The scheme is applicable to only a few fungicides and herbicides but the scope will be extended to include other compounds in these two classes.

2. A modified enzyme inhibition method has been perfected for the detection of nanogram quantities of organophosphorus type insecticides. This qualitative identity test will detect all the organophosphorus compounds and their sulfones and sulfoxides at the tolerance level in most fruit and vegetable extracts in the presence of plant material.
3. Mosquito larvae of the 1st Instar stage (24 hours of age) have been found to be very sensitive to most pesticides, and may be used for bioassay purposes. The eggs of this insect may be stored for several weeks without appreciable loss in the percentage hatch and the test can be performed in test tubes.
4. The fertilized eggs and larvae of the zebra fish have been utilized for the bioassay of dieldrin, parathion, captan, and aflatoxins B₁ and G₁. There is no doubt that this study will have application in the regional laboratories when complete.

(b) Food Contaminants

1. A method has been developed for detecting diethylnitrosamine (DEN) in wheat flour, with a detection limit of 0.6 ppm. Similar methods are being developed for other foods. The in vitro production of DEN from diethylamine and sodium nitrite has been demonstrated in the gastric juices of rabbit, dog, and rat. Investigations are in progress to determine whether secondary amines and nitrite, if present in food,

will cause the induction of tumors in experimental animals.

2. A study has been initiated on the chemical determination of microorganisms in food. Methods for the analysis of diaminopimelic acid, a component of the acid hydrolysate of the cell walls of many bacterial species, are being investigated.
3. A study of the mode of action of the fungal toxin patulin has begun. This compound is known to react rapidly with cell thiols and the protein SH-disulfide transformation has an important function in cell division processes. Patulin is fungistatic to *Neurospora crassa* and has been found to reduce both soluble and protein thiol levels in the conidia. Pretreatment of the spores with non-toxic alkylating agents has been found to potentiate patulin toxicity.
4. A study of the effectiveness of a wide range of fungicides against *Aspergillus flavus* has been completed. Some 23 fungicides were tested for fungistatic activity against three strains of *A. flavus*, two of which were vigorous producers of aflatoxin and one which did not form the toxin. There was no difference in fungicide susceptibility between the three strains. Dichlofluanid and Difolatan were the most effective compounds.

IV. Microbiology Division

(a) Irradiation Microbiology

1. Irradiation of a non-toxinogenic strain of *Cl. botulinum* Type E produces a toxin which will kill whether injected hypodermically or given orally. It kills with symptoms indistinguishable from those of the classical botulinum toxins. The toxin is more heat-resistant than any of the classical botulinum toxins.

Its nature remains to be determined. Unless this is an extremely rare event, it represents a very important finding from the point of view of estimating the possible hazards to be considered from food irradiation practices.

2. Irradiation resistance in *E. coli* has been shown to be correlated with reduced differential rate of synthesis of protein in relation to synthesis of DNA. It has also been shown that unbalanced synthesis rates can be induced by introduction of p-fluorophenylalanine which interferes with protein synthesis. Cells so treated also show an increased resistance to gamma irradiation. Susceptible cells, when irradiated in vivo, show a much greater breakdown of DNA than was found in resistant cells. DNA synthesis immediately after irradiation is much reduced in susceptible cells, but actually increased in the most resistant strains. All results indicate that DNA in irradiation-resistant mutants suffers less damage than those of the wild type.

(b) Mycotoxins

1. Contrary to recent published reports, it has been shown that certain fungi can produce aflatoxin at temperatures as low as 7.5°C. within 8 days and the quantity of the toxins increases steadily during 5 weeks. These conditions duplicate the probable conditions in household experience, namely that the spores would have opportunity to germinate at room temperatures and subsequent growth of mycelium would continue within the refrigerator.
2. An unidentified toxic substance has been extracted from an *Aspergillus* species isolated

from food associated with illness and supplied through the Toronto Regional Laboratories. This toxic substance provides a strong erythematous reaction to the back of a rabbit and is highly active against gram-positive organisms. *Aspergillus niger*, a species very common in foods, has also been shown to produce an unknown toxin.

V. Nutrition Division

(a) Lipids

1. "Metamucil" a hydrophilic colloid which is known to limit the absorption of dietary cholesterol was incorporated into the diet of mature rats. Feeding of up to 1% Metamucil did not impair the utilization of vitamin A or carotenoids. Utilization of a single dose of carotene or vitamin A was not impaired following the feeding of up to 2% Triton WR-1339 a substance recommended for limiting fat absorption.
2. The absorption of orally administered cholesterol was not influenced significantly by vitamin A-deficiency. At the same time there was increased liver storage of cholesterol in vitamin A-deficient rats as compared to normal ones when both groups are maintained on 2% cholesterol diet.
3. Clofibrate (p-chlorophenoxyisobutyrate) was studied in detail in regard to ubiquinone and vitamin A metabolism. This hypocholesterolemic agent was shown to increase liver weight in the rat and inhibit hepatic cholesterol synthesis by imposing a metabolic block. Although synthesis of ubiquinone was inhibited, the concentration of hepatic ubiquinone increased due to a block in degradation. The enzyme succinoxidase was not altered by the changes in ubiquinone.

(b) Vitamin Stability

A long-term project on the stability of multivitamin tablets and capsules is now half completed. Rates of degradation of thiamine, ascorbic acid and vitamin A were determined at 50°, 60°, and 70°C. From Arrhenius plots of these, the rates of degradation at room temperature have been calculated and predictions of stability were made. Every six months assays are made on products kept at room temperature. It appears that the calculated predictions may not be entirely valid.

(c) Vitamin Methodology

1. A method has been developed for the determination of vitamin D in multivitamin preparations, in which vitamins D₂ and D₃ are isomerized with SbCl₃ and separated by GLC. Quantitative estimation of the vitamin is accomplished by use of an internal standard procedure. When applied to the assay of multivitamin preparations the coefficient of variation of the method was 3.2%.

Studies on the distribution of vitamin D in biological materials are currently under investigation.

2. As a result of collaborative studies by 13 laboratories, the barbituric acid method of Pelletier and Campbell has been adopted by the A.O.A.C. as official first action for chemical determination of niacinamide in pharmaceutical preparations.

(d) Nutritional Deficiencies

1. Eight of 100 human livers from the Ottawa area showed extremely low vitamin A contents. As a result, this program now has been expanded to a national basis, to obtain further information on nutritional status of Canadians.
2. Results of experiments with 5 smokers and 5 non-smokers provide additional evidence that cigarette smoking

affects significantly vitamin C levels in blood. In saturation studies smokers retained more vitamin C than non-smokers. During a desaturation period of 13 days on a vitamin C deficient diet the rate of loss of vitamin C was the same in both groups and there was no difference in resaturation tests.

13.2.4.3.1.3

THE CANADIAN DRUG ADVERSE REACTION REPORTING PROGRAMME

E. Napke, M.D.*

Suddenly last decade, basic science hit the practice of medicine. The manipulators of chemical compounds unleashed a torrent of drugs, highly potent and usually specific in action -- at least some appeared to be so. These "atomic pills" (highly potent drugs) coupled with highly effective promotion aimed at both the profession and the public has resulted in an apparent increase in iatrogenic disease or drug adverse reactions (1,2,3,4,5,6). The public has been attuned to immediate cures and demands this of its practitioner, thereby forcing sometimes unnecessary heroic actions for trivia -- penicillin for "colds" and the like. The inter-action of drugs, disease, patient, foods and other drugs, can be so complicated that a serious drug adverse reaction may go for years without being recognized.

Some one to two decades ago drug adverse reactions were considered as a not too intolerable cousin to drug therapy. However isolated groups became wary and in controlled surveys made some startling findings (1,2,3,4,5), namely that the incidence of adverse reactions in a number of hospitals was high and the seriousness of the reactions ranged from mild to death. Then in 1961, thalidomide struck and dumbfounded the world. A "pill" had crossed "barriers" and deformed the intended development of a human. Were there more "barriers" being crossed by other drugs and are some still unrecognized and if recognized how quickly can this information be passed nationally or internationally? Are there tremendous gaps in our knowledge concerning reactions occurring from poly pharmacy or combination of drugs (7), use of drugs on a large scale? Do we know the incidence of drug adverse reactions, common or otherwise, on a national or regional scale?

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What figures we have come from published reports based on a few, relatively small studies (when related to a national scale) in hospitals (1,2,3,4,5). If the results from these studies are true then it is a frightening situation and if these figures can be extrapolated to include all hospitals, then we have a problem of epidemic-proportions in drug adverse reactions. My impression is that we have a major medical problem on our hands. I do not know whether the hospital figures just referred to apply to non-hospital practice. My impression is that there is a difference. The difference may be due to the fact that generally the non-hospital practice of medicine involves less seriously ill patients, less heroic measures, less poly pharmacy but perhaps more shotgun therapy for trivia. We will only know the answers once we have data to work with. This data can only come from the active participation of every practicing physician reporting to the programme Centre. I feel the epidemic cannot be eradicated but it can be limited in extent.

With these last questions in mind, governments, international bodies and professional bodies legislated, or requested some systems, for collection and communication of data concerning drug adverse reactions, as seen from the action of the following five (5) official bodies:-

1. Ad-Hoc Committee of the Royal College of Physicians and Surgeons

The Canadian Programme was started as the result of the recommendations of the Ad-Hoc Committee of the Royal College of Physicians and Surgeons (Brien Committee). This Committee was set up by the Royal College of Physicians and Surgeons at the request of the former Minister of National Health and Welfare, J.W. Monteith. The Committee was instructed to investigate the methods by which new drugs were introduced into Canada. The three-man Committee, consisting of Dr. E.A. Sellers, Head of the Department of Pharmacology, University of Toronto; Dr. Roger Dufresne, Physician-in-Chief, Department of Medicine, University of Montreal and the

Chairman, Dr. F.S. Brien, Physician-in-Chief, Department of Medicine, University of Western Ontario, submitted their report to the Minister of National Health in late autumn of 1962. The Committee in their recommendation advised that the Food and Drug Directorate undertake to "follow-up" new drugs that had been cleared for sale on the Canadian market.

2. World Health Organization

The World Health Organization, following the Sixteenth World Health Assembly (W.H.O.) May 23, 1963, has requested member countries -

(a) To communicate immediately to the World Health Organization

1. Any decision to prohibit or limit the availability of a drug already in use.
2. Any decision to refuse the approval of a new drug.
3. Any approval for general use of a new drug when accompanied by restrictive provisions if these decisions are taken as a result of serious adverse reactions.

(b) To arrange for a systematic collection of information on serious adverse drug reactions observed during the development of a drug and, in particular, after its release for general use.

Also, the Director General (W.H.O.) has been instructed --

(a) To transmit to member states the information received above.

(b) To continue to study the possibility of formulating, and of seeking international acceptance of, basic principles and requirements applicable to the toxicological, pharmacological and clinical evaluation of drugs.

3. Communication and Co-operation with the Provincial Deputy Minister of Health

On August 7, 1963, the then Deputy Minister of National Health and Welfare sent a letter to the Deputy Ministers of Health of each province, advising them of the resolution of the World Health Organization and indicating to them the desire of National Health and Welfare to participate in its Programme.

4. Communication and Co-operation with the Deans of the Medical Schools

The Deans of the Medical Schools across Canada were approached first via a meeting between Dr. J. Wendell Macleod, Executive-Secretary to the Association of Canadian Medical Colleges, and Drs. Morrell, Murphy and Mr. Allmark of the Food and Drug Directorate. This meeting took place in Dr. Macleod's office, APMC, on September 19, 1963. Dr. Macleod was informed of the Directorate's intentions and after an exchange of information and ideas, it was suggested that the matter be brought before the Executive Committee of the Association of Medical Deans when they met in Ottawa on October 11th and 12th, 1963. With the co-operation of the Deans, a Medical Officer was selected for each of the 14 selected teaching hospitals.

5. Food and Drug Directorate Action.

On November 16th a meeting was held in Ottawa attended by representatives of the medical schools. In addition, several other medical personnel interested in the program were present. The drug Adverse Reaction Reporting Programme was initiated with the signing of contracts with the 14 university affiliated teaching hospitals in February, 1965. It is to be noted that in the fall of 1963 the New Drug Regulations made it mandatory that the manufacturer file with the Directorate any new, serious, drug adverse reactions within 15 days on receipt of the same. There are no mandatory regulations for reporting reactions with old drugs.

The objectives of the programme consist of -

- (1) Monitoring the drug usage for acute and chronic drug adverse reactions.
- (2) To inform practitioners on the types and incidence of adverse reactions associated with specific drug or combinations of drugs.
- (3) To advise the Directorate on the evaluation and review of drug labels and professional literature with respect to warnings, contra indication precautions and adverse effects.

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(4) To provide information to the Drug Adverse Reaction Programme of WHO.

(5) To identify unusual reactions.

Two systems have been developed

(1) The Drug Alert System and

(2) The Evaluation and Research System.

The Drug Alert System obtains data from (1) Professional literature and International liaison (2) Manufacturers, (3) and the following, usually on F&D 123's and F&D 122's.

(a) Hospitals - Tri Service Hospital, DVA, Provincial, private and public

(b) Coroners

(c) Practitioners - Medical, Dental, Veterinary

(d) Medical support - Pharmacists, Nurses

(e) Patient Complaint.

The purpose of the Drug Alert system is to (1) warn the Directorate of unusual or high incidence of adverse reactions associated with a class or brand of drug. (2) To estimate the incidence of reactions associated with a specific class of drug or combination of drugs.

(3) To estimate priorities for the scientific investigation of specific drug adverse reactions. With this in mind all physicians, dentists, veterinarians and pharmacists have received pads of F&D 123. In addition, a growing number of hospitals have joined the programme and are submitting either F&D 123 or F&D 122.

The Food and Drug Directorate has established the first phase of its information and education programme, on a continuing basis, to motivate and inform the various sources for reports. The reports are acknowledged and evaluated. They are collated for (1) analysis of methodology of the programme, (2) identification of trends of drug adverse reactions and (3) epidemiological studies. In some instances the physician is requested to write a "letter to the Editor" in the cases of rare, unusual or serious observations in

the hopes that other physicians on "matching" their experience with those in the "letters to the Editor" will then report their cases either to the authors of the letters or directly to the Food and Drug Directorate.

The second system is called the Evaluation and Research System. It is designed

- (1) To investigate specific problems identified in the Drug Alert System by retrospective and prospective techniques.
- (2) To provide scientific evidence to initiate or support decisions by the Food and Drug Directorate on policy and enforcement of regulations.
- (3) To stimulate and co-ordinate research into the incidence, prevention and diagnosis, and treatment of adverse reactions.
- (4) To stimulate and support the development of experts and facilities for the investigation of drug use and abuse.
- (5) To provide data for professional information and education programmes.
- (6) To act as educational units for both staff and students in drug handling and drug adverse reactions.

Generally speaking, the Evaluation and Research System will come into function as the direct result of the "alerting system" or special problems that may turn up. The Directorate will request or set up, retrospective or prospective studies from the following sources: (1) one or more or all of the 14 university affiliated teaching hospitals presently under contract to the Food and Drug Directorate. (2) Contracts with Department of Pharmacy in the Faculties of Medicine of the various Universities. (3) Special centres.

The programme is still developing and growing. Industry will be requested for their co-operation at various stages in the surveillance of a possible drug adverse reaction. Internally the Food and Drug Directorate has planned to meet the expanding needs of the

programme by increasing the staff for the programme. There will be close liaison with the Poison Control Unit.

I think we all agree that it is medically wise and scientific for the physician to be not only aware of the adverse reactions to a drug, but also know the severity and frequency of these reactions for each of the drugs he is using. Only thus will the physician be in a position to equate the safety-therapeutic equation. At the present time we do not know how common the common known reactions are from either a local or national level. I feel it is important to know how common the common reactions are and whether these reactions are increasing or decreasing, and if there are changes, why?

This is one reason why we are collecting all suspicions of, as well as drug adverse reactions, common and otherwise to all drugs, old and new. We must know how common, common is.

It is also important to start gathering data on possible chronic reactions. Is there an early warning symptom, i.e. a rash, headache, etc. which heralds a full blown disease one, two or ten years later. Individually a physician would be lost in this type of data study, however, if everyone contributes to the study, then the problem may be more easily solved. Sometimes a flash of insight occurs to an observer, but the next case with a similar situation may not appear for such a period of time that the original insight has been forgotten. These "Green Birds" (flash of insight) types of phenomena may be matched much earlier if physicians respond to the "letters to the Editor". We are suggesting to physicians, on receipt of either a serious or unusual reaction to write a "letter to the Editor" in the hopes that others with a "matching" reaction or similar situation will also report it to us. It is in the interest of the patient, physician and pharmaceutical industry that drug adverse reactions are reported. A means for reporting has been made available to the profession. It is your duty to report.

As Dr. T.L. Fischer, the Secretary-Treasurer of the Canadian Medical Protective Association states in a letter to me on "reporting of suspicions of Drug Adverse Reactions to the Food and Drug Directorate" he believes that the reporting of drug adverse reactions would be considered as a practice of good medicine. I believe it is.

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13.2.4.3.1.4

SUGGESTED REQUIREMENTS FOR PESTICIDE SUBMISSIONS

1. Specification of purity and identification of active ingredient (including chemical name, common (or trade) name, (or names), empirical and structural formula, physical description, and physical properties (especially M.P., Sp. Gr., Vapour pressure, and solubility).
2. Specification of all formulations, including identity of "fillers", or "inerts".
3. Proposed use, time of application, number of applications, dosage, and crops to which the pesticide is to be applied.
4. Requested tolerance levels, and crops for which the tolerances are required. (Preferably crops should be listed individually, rather than under broad headings such as citrus fruits, cole crops, etc.)
5. Residue data for all proposed crops at time of harvesting. Residue levels in all consumable material (including cattle fodder, etc.) should be included.
6. Evidence of safety in use.

A. Acute toxicity

1. Approximate oral LD₅₀'s in three species minimum (at least one non-rodent) for active ingredient, and LD₅₀ in at least one species for each formulation. (If LD₅₀'s for formulations vary considerably from the anticipated LD₅₀ based on known values for the active ingredient, further studies may be required.)
2. Approximate dermal LD₅₀'s in a minimum of one species. (Symptoms of irritation etc. should also be noted here.)
3. Approximate inhalation LD₅₀ in a minimum of one species. (Respiratory tract, and lung pathology should be performed.)
4. In 1, 2, and 3, a full description of all symptoms, and if possible, of gross pathology should be included.

B. Short-term toxicity

1. Eye irritation studies.
 - a. Limited studies of repeated exposure for 14 days in two animals of a species with similar central corneal thickness to that found in man (0.51 mm). Rhesus monkey (0.52 mm) or Beagle dog (0.55 mm) could be used.
 - b. Supplementary human data from personnel making, formulating, and field testing the product.
 - c. Observations to include all signs of irritancy (redness, oedema, etc.), and physical effects (clouding of cornea, etc.).
 - d. Reassessment of eye condition 14 days after termination of dosing.
2. Dermal irritation tests.
 - a. Limited studies of repeated exposure for 8 hrs/day on 14 consecutive days in four rabbits (scored and unscored shaved skin).
 - b. Observations on all signs of irritancy together with skin histopathology in half the test animals.
 - c. Reassessment of remaining rabbits 14 days after termination of treatment.
 - d. Supplementary human data from personnel making, formulating, and field testing the product.
3. Inhalation tests.
 - a. Studies on one species subjected to 1 hour's exposure at two dose levels, for 14 consecutive days.
 - b. Observations on all toxic symptoms, and at termination, histopathology of respiratory tract, and lungs.
4. Chronic oral tests.
 - a. A minimum of two species (one non-rodent) for oral dosing (both sexes) for 90 days.

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- b. At least 3 dose levels, and a control group, and at least 10 male and 10 female animals/group (rodents) or 3 male and 3 female animals/group (non-rodent), dose levels being selected to give an effect at the top dose level, and no effect at the lowest dose level.
- c. Observations required on general appearance, mortality, growth rate, food consumption, blood chemistry, haematology, organ weights (preferably as organ/body weight ratios), and gross and histopathology.

C. Long-term studies.

- a. At least two species (one non-rodent) dosed orally for 18 months (both sexes).
- b. At least three dose levels and a control group comprising 25 male and 25 female animals/group (rodent), or 6 male and 6 female animals/group (non-rodent), the dose levels being selected to try to give an effect at the highest level, and "no effect" at the lowest level.
- c. Observations as for 90 day tests, supplemented by urinalysis, and organ-function tests. (Observations should be made at commencement, and every 3 months up to one year during the study, as well as at termination).

D. Biochemical studies.

- a. Breakdown products and metabolites should be identified where possible, and, if their toxicity is suspect, short-term tests should be initiated.
- b. Data on absorption of the compound (or its breakdown products).
- c. Data on excretion of the compound (or its metabolites).
- d. Data on enzyme studies.
- e. Data on tissue storage - especially fat, muscle, heart, kidney, liver, and small intestine.
- f. If the compound is liable to contaminate cattle, in any way, milk residue data is essential.

E. Reproduction studies

- a. One species dosed orally from weaning at 2 dose levels (with negative controls), dosing through two litters for 3 generations. Breeding line continued through F_{1b} and F_{2a} litters. F_{2b} litter, and F_{3b} litters used for teratogenic examination at 20 days maternal pregnancy.
- b. General data required:- body weight, (weekly), and gross pathology at sacrifice of all animals.
- c. Reproduction data required:- mating index, fertility index, gestation index, lactation index, litter size, sex ratio, pup weights at birth, and at weaning.
- d. Teratogenic data (including laparotomy data):- Corpora lutea/ovary, implantations/uterine horn, resorptions/uterine horn, stillbirths, embryo weights, embryo sex, gross examination, and 1/3 of all embryos examined for soft tissue, and 2/3 for skeletal abnormalities.

F. Other data

- a. Wild-life studies - acute, and subacute effects on fish, and bird-life.
- b. Rate of soil decay of test material.
- c. Antidotes.

Where no tolerance is required, sections C,E, and F can be omitted.

Alternatives and Comments1. Long-term chronic tests

In these tests, it is suggested that haematology, clinical chemistry, urinalysis, etc. could cease at 12 months, since new effects are unlikely to be noted after this time. The test animals should, however, continue until 18 months (rat) or two years (dog) when autopsy and pathological examinations would be performed as usual. The extended time period will continue to be required until reliable short-term tests for carcinogenicity become available.

2. Combination tests

The long-term chronic toxicity study could easily be combined with the three generation study, the F parental generation being continued after the F_{1b} litter, as the long-term chronic study. The stress factors resulting from reproduction would more closely parallel conditions found in the human population

3. The teratogenicity test (Somer's test) as such does not have a place in pesticide, or food additive testing where exposure of the human population would be on a chronic basis.

4. Organ/B.W. ratio

It seems probable that increased liver weight ratios which are reversible, and can be demonstrated to be associated with increased enzymal activity in the liver could in fact be considered (from the legislative viewpoint) with cholinesterase depression, and a lower arbitrary safety factor could then be employed.

5. Irritation studies (dermal and eye)

It is suggested that the amount of experimental work on animals be reduced to a minimum, and that human data from production and operating personnel be included in submissions as being of more value.

6. Formulations

Data should be provided on at least the LD₅₀ of all formulations. Where a non-predictable variation occurs, three month studies would be required.

7. Metabolites

Where metabolites can be identified in both soil, plant, and animal, then 3 month studies should be requested where acutely toxic compounds are found in soil or plant breakdown products, but not in animal metabolites.

8. Cholinesterase depression

Evaluation safety factors should be placed on some scientific basis. Possibly the dose range between the appearance of plasma, and erythrocyte cholinesterase depression could provide such a basis.

13.2.4.3.1.5

Committee Membership and Consultants During 1967Research Laboratories

In addition to membership on several Directorate Committees, staff members took part in the following:

1. Governmental

Drs. E. Coffin,

M. Sahasrabudhe

and W.P. McKinley

Dr. W.P. McKinley

Dr. A.B. Morrison

Mr. I. Erdman

2. National

Dr. H. Pivnick

Dr. B. Coldwell

Dr. M. Sahasrabudhe

Dr. G. Van Petten

Dr. W.E.J. Phillips

Dr. D. Cook

Dr. J.M. McLaughlan

Dr. T.K. Murray

Dr. D.S. Layne

Dr. A.B. Morrison

- Can. Govt. Sec. Bd.

- Interdepartmental Ctee. on
Pesticides- Interdepartmental Ctees. on Res.
Scientists and Res. Managers

- Interdepartmental Shellfish Ctee.

- Can. Soc. Microbial.

- Program Ctee. for CIFT 1967 Meeting

- Ctee. on Breath Testing.

Can. Soc. Forensic Science

- Educational Ctee., Ottawa Section
CIFT

- Nominating Ctee., Can. Pharmacol. Soc.

- Council, Can. Soc. Animal Care

- Joint Ctee. on Atomic & Molecular
Physical Data, Spectro. Soc. Can.- Protein Requirements Subtee.,
Can. Council on Nutr.

- Borden Award Ctee., Nutr. Soc. Can.

- Nutr. Ctee. Can. Ped. Soc.

- Chairman, Biochem. Panel, Basic
Biology Study of Science Secretariat- Reviewer of 3 grant applications and
2 site visits for Med. Res. Council- Ctee. on National Primate Centre,
Med. Res. Council- Cte. on Drug Institutes, Medical
Research Council

- Canadian Council on Animal Care

3. International

- | | |
|---------------------|--|
| Dr. T.K. Murray | - Nutr. Ctee. Amer. Acad. Ped. |
| | - Codex Ctee. on Foods for Special Dietary Use |
| Dr. J.M. McLaughlan | - Consultant, Ctee. on Amino Acids, Food and Nutr. Bd. (NAS/NRC) |
| Dr. W.P. McKinley | - IUPAC Commission on Pesticide Res. Analysis |
| Dr. M. Sahasrabudhe | - Member of 3 ctees. and one sub-ctee. of Amer. Oil Chem. Soc. |
| Dr. L. Levi | - Quality Control Commission, Int. Pharmaceut. Fed. |
| Dr. B. Coldwell | - Ctee. on Alcohol and Drugs, Nat. Safety Council (U.S.) |
| | - Planning Ctee. 1967 Meeting Int. Assoc. Forensic Sci. |
| Mr. I. Erdman | - WHO-FAC Codex Ctee. on Food Hygiene |
| Dr. F.S. Thatcher | - WHO Expert Panel on Food Hygiene |
| | - Consultant to Food Protection Ctee., Food & Nutr. Bd. (NAS-NRC) U.S.A. |
| | - Expert Panel on Salmonellosis of World Assoc. of Vet. Food Hygienists |
| | - Chairman, Int. Ctee. on Microbiol. Spec. for Foods |
| Dr. A.B. Morrison | - Joint USP-NF Panel on Physiological Availability |
| | - HEW Taskforce on Medicare Panel on Clinical Trials |
| | - Consultant, Ctee. on Marine Protein Resources, Food and Nutr. Bd. (NAS-NRC) U.S.A. |
| | - Ctee. on Amino Acids, Food and Nutr. Bd. (Resigned Oct. 1967) |
| | - Ctee. on Fellows, American Institute of Nutrition |

4. Association of Official Analytical Chemists

- | | |
|-------------------|---|
| Dr. W.P. McKinley | - Joint Ctee. of Mycotoxins,
AQAC - ACCS |
| | - Chairman, Long Range Planning
Ctee. |
| Dr. K.A. McCully | - Referee (Organophosphate Pesticides) |
| Dr. N.P. Sen | - Assoc. Referee (Extraneous
Materials in Foods) |
| Mr. J.C. Meranger | - Assoc. Referee (Cadmium) |
| Dr. T.K. Murray | - Assoc. Referee (Vitamin D) |
| Mr. O. Pelletier | - Assoc. Referee (Niacinamide) |

13.2.4.3.2 Laboratory of Hygiene

The Biologics Control Laboratories of the Laboratory of Hygiene in its dual function of controlling biological drugs, such as vaccines, antisera, and of its role with public health matters, carry out considerable research on bacterial vaccines, serum products and public health laboratory testing.

The studies with vaccines have had a two-fold purpose: to improve our techniques for control testing and to produce better and safer immunizing agents. In the course of this work, a new method for producing vaccines was developed. The resulting product, a lysed (clear) preparation, was prepared by special methods and appeared to be not only more effective than the conventional whole bacterial cell vaccines, but produced fewer unfavourable side-reactions. The Canadian Government (Canadian Patent and Development Corporation) has filed two separate patents for this new procedure and patents have been either issued or are pending in 42 countries. Included in the latter is one in Russia where the registering of Canadian patents is a very rare occurrence.

Our first experimental preparation--a staphylococcus vaccine--is now being produced by a commercial firm in the U.S.A. The vaccine is being used for the prevention and treatment of staphylococcal mastitis in cattle and has now been on the market for three years. The vaccine was well received, and sales have been increasing steadily since its introduction. Approximately one million doses were distributed in 1967 and indications are that sales will be considerably higher in 1968.

Our vaccines have received international recognition and the Laboratory of Hygiene was invited by W.H.O. to produce a meningococcal vaccine for use in special areas in Africa where cerebro-spinal meningitis has been a scourge for many years. These studies are still in progress; some 50,000 persons have been given vaccine manufactured in our laboratory. The preliminary indications are that the vaccine is effective (there have been no cases in the immunized while there have been some in the non-immunized) and

the reactions have been encouragingly mild. A further study involving 300,000 persons is now in the planning stage. In addition to the above, a number of other experimental vaccines for the prevention of typhoid, paratyphoid A and B infections, and for gonorrhea have been developed and are being studied.

13.2.4.3.3 National Health Grants and Organized Home Care Programs in Canada

Organized Home Care, first conceived on this continent at the Montefiore Hospital of New York, is a program which arranges for and co-ordinates the use of a wide variety of health and welfare services and equipment procured from community resources to meet the needs of selected patients in their own homes through (1) centralizing responsibility for administration of care with the home care staff and (2) co-ordinated planning, evaluation, follow-up and control of services. Those patients are considered suitable whose treatment can be provided in the home, whose needs cannot be met on an out-patient basis, who do not require hospital care, whose home is suitable physically and psychologically, services required are available or can be feasibly developed within the community.

Soon after the establishment of the National Health Grants Programme an intradepartmental study group and task force was formed to study the possibilities of developing and supporting such programs in order to release hospital beds, maintain in the home persons who could, with the proper care and supervision be cared for without hospitalization, and develop team capabilities for community care services. The beginnings were slow with a few pioneer programs scattered across the country. The readiness of several hospitals and the Victorian Order of Nurses in various provinces to undertake the administration of Home Care Plans were factors in their evolution. The Department provided, in addition to grants, considerable encouragement and technical advice. By April 1967, there were 26 programmes in six provinces.

Since the beginning of Home Care in Canada, considerable progress has been made particularly in the last two years in developing province-wide policies and programs to embrace existing Home Care Plans and make provision for the orderly establishment of new plans.

Home Care in Ontario

The first six home care programs in Ontario were all started as pilot projects under the Federal Health Grant Programs

supplemented by the Ontario Hospital Services Commission. On the 31st of March, 1967, Federal Health Grants Program support was replaced by support from the Ontario Hospital Services Commission and the Ontario Department of Health. The objectives of home care programs in Ontario have been:

- (1) to release hospital beds,
- (a) by early discharge of selected patients who could complete the treatment program at home, and
- (b) by the admission of patients to the home care plan in lieu of admission to hospitals for treatment;
- (2) to arrange for, co-ordinate and control the use of services required for the treatment of the patient under direction of the physician in a manner that will make the best use of all services and facilities.

The first home care program in Ontario was established in Toronto as a pilot project in April 1958. By 1964 it was stabilized as a continuing service and went into operation as a separate agency. It serves a population of 1,178,470. The Ottawa Home Care Program went into operation in September 1964. It serves a population of 375,000 persons. The Guelph Home Care Program went into operation in September 1965. It serves a population of 90,695 persons. The Hamilton Home Care Program went into operation in August 1966. It serves a population of 363,496 persons. The London Home Care Program went into operation in October 1966 serving a population of 181,396 persons. The Windsor Home Care Program went into operation in August 1966. It services a population of 188,958 persons. The total budget for the six Home Care Programs in Ontario is \$1,481,344. With the exception of the Toronto program, all six organized home care programs, which they envisage as treatment service programs, they recommend for comprehensive care the development of an alternative program envisaged as services and supervision. The model for this program is the Information and Service Bureau of the Ottawa Health Department. This program was initially started in 1956 as a pilot project by the City of Ottawa with the assistance of a National Health Grant.

The three year pilot project demonstrated the value of a service which consisted of care to the elderly and chronically ill by planning for continued care to enable discharge from hospital, finding and supervising suitable accommodation either in their own home, the home of relatives, boarding homes, nursing homes, or homes for the aged and the provision of supportive health and welfare services. In order to provide a comprehensive program of care in the home throughout Ontario, an inter-departmental committee consisting of representatives of the Ontario Hospital Services Commission and the Ontario Department of Health have looked into the requirements for the province.

Home Care in the Prairie Provinces

The Winnipeg General Hospital initiated its Home Care program under a National Health Grant, Subsequently Home Care Programs were developed and financed by the Manitoba Hospital Commission and now include a city-wide program involving the hospitals and community. Another Home Care program for chronic patients is conducted by the Manitoba Department of Health.

In Saskatchewan, the first formal Home Care Program began to operate in Moose Jaw City in 1963 sponsored by the Moose Jaw and District Medical Society and financed by National Health Grants for the most part, although welfare resources and patient payments assisted in covering some of the costs. Around the same time, the Department of Rehabilitation Medicine at the University Hospital in Saskatoon developed a program also financed by National Health Grants but for rehabilitation and long-term home care of selected chronically ill persons. The Department of Psychiatry at University Hospital developed a hospital based program to provide services for persons suffering from mental illness in the Saskatoon area. The program initially financed by a private foundation was also assisted by National Health Grant funds. Public Health Nurses on the staff of the Saskatoon Rural Health Region provide follow-up services at no cost to the program. A program sponsored by the District Medical Society was initiated in Prince Albert in 1965 as a community based program financed by the National Health Grant

funds primarily. The National Health Grants community-based program in Regina commenced in 1964. It was noted in Saskatchewan that a common characteristic of all these programs was the limited participation by government public health agencies for other than financing aspects of the program. They were instead built around the administration of the VON or the University Hospital. The first provincially planned program began in the Central Butte Area operated under the auspices of the regional board of health with the medical health officer's staff carrying out the tasks and financed by provincial grants. Moreover, organized home care services to patients discharged from mental hospitals is an activity carried on under psychiatric services to the province. During 1967 plans were formulated for a province wide program with the co-operation of the Victorian Order of Nurses assured. One of the problems noted in Saskatchewan at that time was the difficulty in comparability between programs in order to save trial and error in the planning and extension of home care in Saskatchewan. It was also recognized in Saskatchewan that the terms hospital-based or community-based were often more arbitrary than real and that it was possible to consider a combination of both types of programs which, regardless of where the administrative office was based, community as well as hospital involvement was indicated. The advisory planning committee on medical care of that province in its final report issued a set of objectives for home care programs. They also suggested a co-ordinating role for the province and suggested that it was most logical to delegate to regional boards of health the responsibility of developing home care services with clinical leadership coming from the family physicians and the board of health bearing the responsibility for providing and organizing other services. The committee also considered the shortage of visiting homemakers and the lack of facilities for their training; however, they believed that this could be accomplished through voluntary and church organizations. In the matter of patient aids and equipment, however, it was recommended that an equipment depot

was advisable whereby equipment could be made available on a loan or rental basis with the local hospital acting as the depot, of course.

Quebec

Dramatic advances in the organization of home care services have been observed in the Province of Quebec. Here a network of some 25 home care plans is already in operation and provisions are being made for their extension. The Province of Quebec makes submissions under the terms of the General Public Health Grant for federal assistance towards the continued development and extension of home care services. Under the terms of the General Public Health Grant no matching of funds by the province is required. In Quebec, hospital based home care programs are available in the Herbert Reddy Memorial Hospital which had the first home care program in Canada, the Montreal Children's Hospital, l'hôpital Ste Jeanne d'Arc, Montreal. Region wide or community based home care programs are known to exist in Hull and Point Gatineau which has a well established program. There is one in the region and City of Quebec, one in Granby, one in Alma, one in Jonquière, one in the Diocese of Nicolet, one in the Diocese of St. John, one in La Tuque, one in the Diocese of St. Jerome, one in the Diocese of Trois Rivières, one in the municipality of Outremont and another city wide home care program in the City of Montreal. There are new ones as well in Sherbrooke, Chicoutimi, Montmorency. The St. Joseph de Rosemont Hospital has a special home care program for patients discharged with a diagnosis of tuberculosis or other pulmonary disease. This has involved the use of special equipment which can be placed in the home and whereby the patient can receive care and supervision in the home, thus shortening the time required for hospitalization.

British Columbia

Federal assistance to home care in this province has been given under the Medical Rehabilitation and Crippled Childrens grant. Under this program home care, which is mainly home nursing care and generally geriatric care, is provided to patients in their homes.

In 1965 this service was available at 65 centres, generally health units, to 113 districts or 80% of the population in the provincial health units. The objectives of this program are to provide a maximum amount of self care and rehabilitation for patients in their own home or in some 126 personal care institutions which are also served by this program. In a number of health units where physiotherapists were taken on staff, it has been possible for the public health nurse and physiotherapist to work with the operators of these personal care institutions to assist in setting up activation programs. In addition, some six part-time physiotherapists have provided in-service training and rehabilitation nursing to the public health nurses in nine health units. The concept of home care in British Columbia is somewhat different from that in the other four provinces in which home care has been developed and applies mainly to rural programs outside the organized large city centres.

13.2.4.3.4 The Smoking and Health Program¹

On June 17, 1963, the Minister of National Health and Welfare told the Canadian House of Commons: "There is scientific evidence that cigarette smoking is a contributory cause of lung cancer, and that it may also be associated with chronic bronchitis and coronary heart disease. Health agencies, including my department, have a duty to inform the public about the risk to health connected with cigarette smoking".

The basic consideration in approaching the problem was the fact that the medical aspect was encompassed by the social one. Cigarette smoking, apart from its personal satisfaction for the individual, had become generally acceptable in society and had developed an identification with certain conceptions of human freedom. The latter became the sharper when they were challenged. Broadly speaking, there were three courses open:

- (1) Research
- (2) Education
- (3) Legislation
- (4) A combination of above

Recalling the dismal results of Canada's attempted prohibition of alcoholic beverages in the 1920's, Departmental thinking favored a program of health education in the matter of the cigarette. The possibility of some form of restrictive legislation was carefully considered and has been constantly examined since. It remains a possibility at the moment. So far, however, Departmental policy has been to appeal to the intelligence of the individual and provide the authentic information on which that intelligence may be exercised. It has been assumed that, should the situation reach a point where legislative action appears justified, the educational program will still remain a major requirement.

Practical implementation of a Canadian Smoking and Health Program began early in 1964. To the Departmental medical consultant and health education consultant already involved, an information officer was added on a full-time basis. These three became the basic

¹See: "A Case History - The Canadian Smoking and Health Program" The Department, (1967)

working and planning team, closely associated with senior officials at the policy level. The same team has remained intact, making for valuable continuity as well as a constant meeting place for the strongly-held convictions of three distinct disciplines.

A general course of action had been advanced in the Department's own brief and approved at a founding conference. This offered a natural starting point and a framework within which to begin operations. It called for a phased approach to five distinct national audiences, in the following order of precedence:

- (1) The health professions.
- (2) The teaching profession
- (3) The student population
- (4) National Organizations with specific interests in the cigarette smoking issue.
- (5) The general public

Choice of the first audience was an obvious one. Not only were professional health workers most naturally knowledgeable on the subject, they represented that group to which others would turn for confirmation or rejection of the information offered by the Program. The immediate need for this group, according to an assessment, was an authoritative reference book consolidating the most significant reports of the smoking and health issue, and offering assistance to doctors and others in their detailed advice to members of the public.

The "Smoking and Health Reference Book (Canada)" was begun in March, 1964. Two months after its authors began to select or write its contents, it was delivered by the Queen's Printer, 170 pages demanding the medical and technical accuracy required by an expert readership. Given a special green light at every stage of its production, it established something of a speed record for a Departmental publication. Because of its swift appearance, it was able to pick up the original momentum of public interest aroused by the Ottawa conference and by the United States' Surgeon General Report, which had been released in January, 1964.

Put in circulation in a well-synchronized operation, copies reached parliamentarians, newsmen and every Canadian doctor simultaneously. As the first concrete evidence of the program in action, the book was given widespread coverage by the news media. It also received attention in other countries where smoking and health programs were under way.

Three years after its publication the Reference Book remains the "bible" of the Program. Its official summaries of the Royal College, American Cancer Society and U.S. Surgeon General's Reports still offer points of international reference. Its domestic surveys, particularly the Department's own "Canadian Study of Smoking and Health", give it distinctive Canadian content. Its ready-reference section (answers to the most-frequently-asked medical questions on smoking) remains valid. As with all federal publications, there are both English and French editions.

Subsequently, a series of displays, to be exhibited at major medical and public health conventions, was undertaken. Smoking machines, excellent attention-getters and participation inviters, were incorporated in these to demonstrate the dangerous tar content of cigarettes and the advantages of non-inhaling. The same displays have subsequently been used with more generalized audiences. A leaflet prepared as a handout with the original display has proven a durable permanent publication, having been reprinted several times for both Departmental and voluntary use. Other projects developed for professional public health workers have included a desk card for doctors and other offices and a bedside card for use in hospitals. The latter is addressed to the patient who, for medical reasons, is having to make at least a temporary break with the habit.

Similarly, school teachers and students have received the message through kits of pamphlets, posters, reference lists, "comics", films, ads, etc., through the provincial departments of health and education. Animated film cartoons produced by NFB have reached the public in theatres and on television, and have won international awards for their high quality.

The basic objective laid down for the Canadian Smoking and Health Program was: "To reduce the incidence of lung cancer and other diseases attributable to cigarette smoking, by the reduction or elimination of this health hazard."

Acceptance of the Program as being necessarily a protracted one is not only rooted in the likelihood that society will only gradually abandon the habit, but also in the knowledge that there will be a considerable period before the most pertinent statistics-- those of mortality and morbidity -- can be expected to reveal the extent to which the ultimate situation is being affected by present developments.

Three immediate objectives of the health education program were also specified in 1964 and here evaluation is more readily arrived at:

(1) "To inform the public about the risks to health connected with cigarette smoking".

- Within a year of the Program's start a national survey showed that over 90% of the adult Canadian population had become knowledgeable of the Smoking and Health issue, with the majority convinced of the danger.

(2) "To encourage smokers to discontinue the habit".

- By the end of 1965 a country-wide survey made for the Department showed that more than a million regular cigarette smokers had overcome the habit, more than half of them having done so in the previous five years. Of the 5,500,000 who still made daily use of the cigarette, 2,500,000 had seriously attempted to quit. A study by the Canadian Cancer Society, in February and March, 1967, showed a six percent reduction since 1961 in the proportion of smokers among Canadian men.

(3) "To dissuade non-smokers from acquiring the habit".

- With at least 300 young Canadians taking up cigarette smoking each day, the above objective clearly has major bearing on the future and, equally clearly, indicates that it will be the most difficult to attain.

Evaluation at this stage is, necessarily, more in terms of the force that has been mounted than of objectives gained. Organized for a still-lengthy campaign, with the Department firmly committed to seeing it through to success, the Program could best be described as being at "the end of the beginning".

13.2.4.3.5 Prosthetic Services

A development unit to evaluate experimental equipment was established at the Prosthetic Centre at Sunnybrook Hospital in Toronto. Here prototypes are tested before the design is crystallized for manufacture.

In-training service is conducted through regular seminars. Instructors from Toronto visit all Prosthetic Centres across Canada to co-ordinate new designs, update shop practice, and check quality control.

Fitter education and the patient-fitter relationship are the main emphasis of the in-training program.

With new materials and improved designs, Prosthetic Services are endeavouring to keep pace with new amputation techniques.

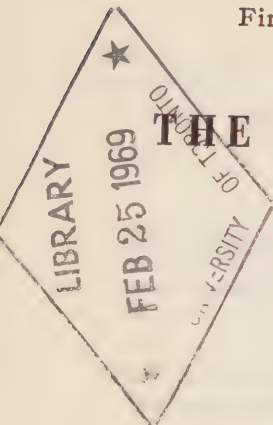
During the past year a highlight of this service was to introduce a new developing technique - immediate post-operation fitting, or "instant prosthesis".

In direct fitting or immediate post-operative prosthesis, an artificial limb is fitted to the patient while on the operating table. The benefit to the patient is both physical and psychological. Formerly the patient, after amputation, might sit around for weeks in a wheel-chair, waiting to be fitted with a prosthesis, and developing a psychiatric outlook about the future. Clinicians have often found this more difficult to treat than the amputation stump.



Government
Publications

First Session—Twenty-eighth Parliament
1968



THE SENATE OF CANADA

PROCEEDINGS

OF THE

SPECIAL COMMITTEE

ON

SCIENCE POLICY

The Honourable MAURICE LAMONTAGNE, P.C., *Chairman*
The Honourable DONALD CAMERON, *Vice-Chairman*

No. 14

THURSDAY, NOVEMBER 28th, 1968

WITNESSES:

Department of Veterans Affairs: Dr. D. M. Starkey, Consultant to the
Director-General of Treatment Services in Laboratories Services.
Dr. G. D. Caldbick, Director of Treatment Administration.

APPENDIX

12.—Department of Veterans Affairs

The Queen's Printer, Ottawa, 1969
OTTAWA, 1969

MEMBERS OF THE SPECIAL COMMITTEE
ON

SCIENCE POLICY

The Honourable Maurice Lamontagne, *Chairman*

The Honourable Donald Cameron, *Vice-Chairman*

The Honourable Senators:

Aird	Hays	O'Leary (<i>Carleton</i>)
Belisle	Kinnear	Phillips (<i>Prince</i>)
Bourget	Lamontagne	Robichaud
Cameron	Lang	Sullivan
Desruisseaux	Leonard	Thompson
Grosart	MacKenzie	Yuzyk

Patrick J. Savoie,
Clerk of the Committee.

ORDERS OF REFERENCE

Extract from the Minutes of the Proceedings of the Senate, Tuesday September 17th, 1968:

"The Honourable Senator Lamontagne, P.C., moved, seconded by the Honourable Senator Benidickson, P.C.:

That a Special Committee of the Senate be appointed to consider and report on the science policy of the Federal Government with the object of appraising its priorities, its budget and its efficiency in the light of the experience of other industrialized countries and of the requirements of the new scientific age and, without restricting the generality of the foregoing, to inquire into and report upon the following:

(a) recent trends in research and development expenditures in Canada as compared with those in other industrialized countries;

(b) research and development activities carried out by the Federal Government in the fields of physical, life and human sciences;

(c) federal assistance to research and development activities carried out by individuals, universities, industry and other groups in the three scientific fields mentioned above; and

(d) the broad principles, the long-term financial requirements and the structural organization of a dynamic and efficient science policy for Canada.

That the Committee have power to engage the services of such counsel, staff and technical advisers as may be necessary for the purpose of the inquiry;

That the Committee have power to send for persons, papers and records, to examine witnesses, to report from time to time, to print such papers and evidence from day to day as may be ordered by the Committee, to sit during sittings and adjournments of the Senate, and to adjourn from place to place;

That the papers and evidence received and taken on the subject in the preceding session be referred to the Committee; and

That the Committee be composed of the Honourable Senators Aird, Argue, Bélisle, Bourget, Cameron, Desruisseaux, Grosart, Hays, Kinnear, Lamontagne, Lang, Leonard, MacKenzie, O'Leary (*Carleton*), Phillips (*Prince*), Sullivan, Thompson and Yuzyk.

After debate, and—

The question being put on the motion, it was—

Resolved in the affirmative."

Extract from the Minutes of the Proceedings of the Senate, Thursday, September 19th, 1968:

“With leave of the Senate,

The Honourable Senator Lamontagne, P.C., moved, seconded by the Honourable Senator Benidickson, P.C.:

That the name of the Honourable Senator Robichaud be substituted for that of the Honourable Senator Argue on the list of Senators serving on the Special Committee on Science Policy.

The question being put on the motion, it was—

Resolved in the affirmative.”

ROBERT FORTIER,
Clerk of the Senate.

MINUTES OF PROCEEDINGS

THURSDAY, November 28th, 1968.

Pursuant to adjournment and notice the Special Committee on Science Policy met this day at 3.30 p.m.

Present: The Honourable Senators Lamontagne (*Chairman*), Belisle, Grosart, Hays, Kinnear, Robichaud, Thompson and Yusyk. (8)

Present but not of the Committee: The Honourable Senator Carter and Connolly (*Ottawa West*). (2)

In attendance: Philip Pocock, Director of Research (Physical Science).

The following witnesses were heard:

DEPARTMENT OF VETERANS AFFAIRS:

Dr. D. M. Starkey, Consultant to the Director-General of Treatment Services in Laboratories Services.

Dr. G. D. Caldbick, Director of Treatment Administration.

(A curriculum vitae of each witness follows these Minutes.)

The following is printed as Appendix No. 12: Brief submitted by the Department of Veterans Affairs.

At 5.15 p.m. the Committee adjourned to the call of the Chairman.

ATTEST:

Patrick J. Savoie,
Clerk of the Committee.

CURRICULUM VITAE

Starkey, Duncan Hugh: Born: August 13, 1906 (Montreal); Schools, preparatory (Montreal and England); Marlborough College, Wilts, 1919-24; (Senior Matric, Univ. of London, First MB Cambridge Univ.); University (1924-31)—McGill University, Montreal—B.A., M.D., C.M. Post-graduate (1931-35), Royal Victoria Hospital and Depts of Pathology and Bacteriology, McGill University; Specialist qualification Bacteriology, Royal College of Physicians and Surgeons of Canada (1947); Fellow, College of Pathology (Great Britain) 1963. *Appointments:* 1933-40, Demonstrator in Bacteriology and Immunology, McGill University; 1935-40, Bacteriologist to Royal Victoria Hosp., Montreal Maternity Hospital and Montreal Neurological Institute; 1940-45, Royal Canadian Navy (VR), i/c of all hospital laboratory Services, director of laboratories RCNH Halifax, consultant for Eastern Air Command (RCAF) and for Army (MD 6); 1945 to date, Adviser for Laboratory Services to Director General of Treatment Services, Dept. of Veterans' Affairs and Director of Laboratories of Queen Mary Veterans' Hospital, Montreal. *Recent and current special appointments:* Consultant in Bacteriology, Canadian Forces Medical Council (1950-62); Vice-chairman, Medical Research Council Associate Committee on the Control of Hospital Infections (1957-65); Member, Research Advisory Board, Dept. of Veterans' Affairs; Member, Defence Medical Research Advisory Committee; Member, Technical Advisory Committee, Dept. of National Health; Member, Research sub-committee in Microbiology, Dept. of National Health (1962-65); Member, standing Committee on Technician training, Canadian Association of Pathologists (and Can. Med. Assoc.) 1956-65; Member, Research Committee on Staphylococcal Infections, Veterans Administration (USA); Examiner, Royal College of Physicians and Surgeons (Canada) for Bacteriology (9 years), Pathology (3 years); Member, Panel on Antibiotics, Defence Research Medical Section; Member, Committee on Infections within Hospitals, Am. Hosp. Association. *Societies and Associations:* Canadian Medical Association; Canadian Association of Pathologists; Canadian Association of Medical Bacteriologists; Canadian Society of Microbiologists; Canadian Society for Clinical Investigation; Canadian Society of Chemotherapy; Canadian Public Health Association; Province of Quebec—Association of Bacteriologists; Society of Microbiologists; Association of Laboratory Physicians; Medico-Chirurgical Society (Montreal); College of Pathology (Great Britain); Pathological Society of Great Britain and Ireland.

Caldbick, Dr. George David: Born: Cobalt, Ontario, January 23rd, 1910; Queen's University, Medicine, 1937, M.D., C.M.; Internship and General Practice 1937-1940; R.C.A.F. Medical Branch 1940-1945, Canada (Overseas); Toronto

University—Diploma of Public Health, 1945-1946; Reappointed to the R.C.A.F. Medical Branch 1946 and continued to serve in various staff appointments until Compulsory Age Retirement January, 1965, with rank of Air Commodore; Defence Research Board, Ottawa—Senior Scientific Staff Officer, 1965-1967; Department of Veterans Affairs, Director of Treatment Administration, September 1st, 1967 to date; Certified in Aviation Medicine by the American Board of Preventative Medicine, 1954; Certified by the Royal College of Physicians and Surgeons of Canada in Dermatology, 1956; Fellow of American College of Preventative Medicine, 1956; Married—2 dependents—1 daughter, 1 son.

THE SENATE

SPECIAL COMMITTEE ON SCIENCE POLICY

EVIDENCE

Ottawa, Thursday, November 28, 1968

The Special Committee of the Senate on Science Policy met this day at 3.30 p.m.

Senator Maurice Lamontagne (Chairman) in the Chair.

The Chairman: Honourable senators, we have with us this afternoon representatives from the Department of Veterans Affairs: Dr. D. H. Starkey, Consultant to the Director General of Treatment Services in Laboratories Services, and Dr. Caldbick, Director of Treatment, Administration. As usual, we will have a brief opening statement, which will be made by Dr. Starkey.

Dr. D. H. Starkey, Consultant to the Director General of Treatment Services in Laboratories Services, Department of Veterans Affairs: Senator Lamontagne, honourable senators, I just wanted to say one or two words to begin with, perhaps to try to give an overall impression of what this program represents, another way of looking at it, so to speak, apart from the formal brief.

It is a relatively small program and the objects stated formally in the text of the submission are quite correct, but I think there is another way of looking at it. The whole objective of the program is really the creation of conditions in the hospitals that will not frustrate the medical man who feels there is always something new to be learned; that is the forward-looking man who does not want to stand still. As far as I am concerned, I think it is fair to say that this applies to everybody who has been concerned with this program since it started. That is really the nub of the objective.

In the senior ranks the people to whom we are referring, whom we wish to encourage and give facilities to, are the good teachers. In the junior ranks they are the young men and women we want to keep in Canada; we

want to keep them in the profession. They are the forward-looking people.

The program is limited to the veterans' hospitals, but I hope when you look over the brief you will see that it is, so to speak, a microcosm of what really every good teaching hospital is trying to do. In some ways you may find that this relatively small brief can be looked at as a type. In the Medical Research Council brief and in the activities under National Health and Welfare you may not see this angle of clinical investigation and supporting research at, so to speak, the working level. When I use that term I would not want to be misunderstood. I do not mean that in other cases people are not working. I mean that this is essentially a program to support the people who are treating the sick and are teaching, and it is giving them an opportunity also to go on investigating and not stand still.

There are a few other points which perhaps are not too well brought out in the brief. I think the main one is a very difficult one to bring out, and that is what we consider urgent developments of investigation in the psycho-social field. In many ways, in the practice of medicine and in medical research this is rather a new approach. We are bringing in interested psychologists and interested sociologists, and it is the same problem that we have in many other disciplines now, that things have got so big that we have to tackle them on a team approach.

You may have noticed in the brief that we refer to one unit as a psychiatric unit. It has been known as that because it was started by the psychiatrists, but the psychiatric unit is actually a team. It is supported by psychologists from both the University of Montreal and McGill in Montreal, and also sociologists. They are working as a team. It also has another interesting angle in that it is opening up a field for graduate students in these disciplines to work on and in the hospital problems. It is therefore quite an unusual training

ground. I do not think it exists anywhere else in Canada at the present time, but we would like to develop it.

I think those are the main points, sir. If there are any questions I should be glad to try to answer them.

Senator Robichaud: I have a general question which I should like Dr. Starkey to answer. I think you mention in the brief—and we know it has been going on for a number of years—that DVA is gradually moving out of the veterans' hospital field by transferring existing hospitals to provinces or other corporate boards. Is consideration being given at the same time to the phasing out of this research program under DVA?

Dr. Starkey: Medically speaking, sir, what happens is that an authority that agrees to take over the hospital also agrees to take over the obligations of treating the veterans. Of course, all these research projects of ours are actually being run by the medical schools, because all our staff are teachers in the medical schools.

Senator Robichaud: You say all your staff. You mean all your medical staff?

Dr. Starkey: Yes.

Dr. G. D. Caldbick, Director of Treatment Administration, Department of Veterans Affairs: Research staff.

The Chairman: All those who are mentioned here as having received financial assistance for research?

Dr. Starkey: Yes. Pretty well all our clinical treatment staff at the hospital are also teachers at the universities. Therefore, if the hospital is being taken over the obligation for veterans' care is also being taken over, and the people who are responsible for running the medical services remain the same. They may have to look to other agencies to find the money to carry on what they have been doing.

Senator Robichaud: You mean government agencies or private?

Dr. Starkey: Well, wherever it is available, wherever it is appropriate.

The Chairman: In Canada it would be mostly governments I am sure.

Senator Robichaud: That is why I asked the question Mr. Chairman.

Dr. Starkey: Last year our straight DVA funds were \$350,000, but we got \$109,000 in the current year from other sources—the Canadian Heart Foundation, the Canadian Cancer Research Funds, the Canadian Arthritis and Rheumatism Society—quite a number of agencies.

Senator Robichaud: Who, in turn, are receiving Government grants too, are they not?

Dr. Caldbick: Yes.

Senator Carter: I gather from what the witness said that these programs are initiated by the department, is that correct? How do you start these programs?

Dr. Starkey: Within the hospital, sir?

Senator Carter: Yes. Who takes the initiative? Who decides what line of research you are going to take? How do you develop the program?

Dr. Starkey: It depends on the interest of the person. It has to be the initiative of the person who has the capability of doing it.

Senator Carter: You find a doctor or scientist interested in that particular line of research?

Dr. Starkey: It goes up through a chain of command, so to speak. If he is a member of the Department of Internal Medicine he goes to the Chief of Medicine and they thrash it out, and we have these research committees in each hospital go over the feasibility, and so on.

The Chairman: Then it is referred to Ottawa?

Dr. Starkey: Yes.

Senator Carter: I am interested here in Objective B: the interest in disabilities directly relatable to military hazards. You say this has declined, and so forth. I take it you investigate the relationship of the conditions of veterans to their military service. For example, they develop certain ills as they get older. Do you find out to what extent these ills may be related to their military service, as distinct from their war disabilities?

Dr. Starkey: That would come into it, yes. It is rather a question of priorities. Our No. 1 priority is the disabled, the man in respect of whom there is a disability pension for a disa-

bility which was caused by war service. Therefore, if you have two investigations and you have only enough money for one, the one related to war service and continuing disability is going to get the priority.

Senator Carter: With regard to the relationship of those other conditions to war disabilities, do you have any liaison with the Pensions Commission on that?

Dr. Starkey: Yes, constantly.

Senator Carter: You take the veteran who has lost a leg, probably amputated right up to the hip. You fit him out with an artificial limb but he is not very mobile. Eventually, because he is not very mobile, he probably gets overweight, and because of this overweight he gets cardiovascular disease and has a heart attack which could, in my opinion, be related to his amputation. I have never got the Pensions Commission to buy that kind of argument. Are you doing anything to help in that direction?

Dr. Starkey: This is a constant problem.

The Chairman: Your research program would not be related to that kind of problem, I would assume.

Dr. Starkey: I would have to say "yes and no". This actual problem of the relationship of heart disease or coronary heart disease to amputation and relative physical immobility was the subject of a special inquiry, and actually the most significant statistics were obtained from Metropolitan Life. They had the statistics on this that made it rather a waste of time for us to try to go any further with it. I think the eventual decision of the Pensions Commission was based on the statistics obtained from the Metropolitan Life or, maybe, other insurance companies.

Senator Carter: What was the result of these statistics? Can you remember what their findings were? Did they find any relationship between the obesity and the lack of mobility?

Dr. Starkey: Yes, there was a relationship. On the other hand, it was not a relationship that could not be overcome; it was a treatable relationship; it was not necessary to become obese.

The Chairman: I suppose if you stop eating!

Senator Carter: It is a very vital problem for veterans because many are pensioned on fairly small pensions, but because of their disability they develop other disabilities later on which, I think, if we had enough research, could be proved to be related to their war disabilities. If a veteran develops conditions related to the war disability he is pensionable under the act, but you have to prove that relationship. The problem also arises in their treatment. They cannot get treatment for obesity unless it is related to their war disability or service.

The Chairman: But the Commission would not communicate with your research personnel in order to have their advice on such cases, I presume? They have their own expert witnesses before them, I suppose.

Dr. Starkey: I cannot really say in what order they did it. But they go to the Director General of Treatment Services. The Director General then goes to his senior people who are authorities in the field being dealt with. I was in on it because I was strongly supporting a research program in obesity at the time, and the Director General, Dr. Crawford at that time, felt there possibly was a relationship, as Senator Carter has said. But eventually, I know, the decision was made statistically rather than on research medical grounds, because the connection is so tenuous.

That is what I meant here when I said "either as direct consequences or as indirect consequences". This chain reaction of which you speak is what I had in mind when I said "indirect consequences" as people get older. This whole field of chronic disease is very much of a burning question in medicine.

The Chairman: But since your research program is not really initiated by you, I do not see how it could be related to the work of the commission.

Senator Carter: Yes, Mr. Chairman, if the evidence is available, hard and fast evidence, the pensioner himself can submit that as part of his evidence to support his claim.

The Chairman: But we have just been told the department does not initiate research projects. The department waits to receive applications from their own research people in various hospitals, so I do not see how this kind of research activity could be related to the work of and the evidence required by the Pensions Commission.

Senator Carter: Well, if the results of their research are made available to the pensioner he can use that as evidence to support his claim, I would think.

The Chairman: I do not know. I am just trying to find out.

Dr. Starkey: The pensioners are brought into our hospitals for reassessment at stated intervals. Therefore, the pensioners' problems are continuously being presented to our people who are running the treatment services. Therefore, although it may not be in the form of a formal submission from the Pensions Commission, it is a challenge to the medical person because he is seeing these people all day and every day. He is seeing the problems as he is assessing the cases. Therefore, the connection is continuous all the time, although it may not be formal. Then, occasionally the Pensions Commission at a particular point will ask a direct question as to whether we will mount a definitive investigation.

The Chairman: But this would not be part of your normal research activities in the hospital?

Dr. Starkey: No.

Senator Carter: I have some more questions, Mr. Chairman, but I will give somebody else a chance.

The Chairman: Yes. Senator Hays?

Senator Hays: With the new hospital plan in Canada the provinces are operating most of the hospitals. Can you tell us what percentage of veterans in areas where there are public hospitals are using the veterans' hospitals now, and what percentage are being treated under the ordinary hospital program?

Dr. Starkey: I am afraid I have not got those figures.

The Chairman: Have you not even some approximation?

Dr. Starkey: Perhaps Dr. Caldbick has.

Dr. Caldbick: I would think that a good 90 per cent of the veterans who have entitlement are being treated in our hospitals. By "entitlement" I mean having a pensionable disability from a war wound. I would say 90 per cent of those people are being treated in our hospitals today.

Senator Hays: These are pensioners?

Dr. Caldbick: Yes, these are pensioners.

Senator Hays: I am referring to the people who are veterans but who do not use the veterans' hospitals, and who find it more convenient for one reason or another to go to hospitals elsewhere.

Dr. Caldbick: Well, any person who has entitlement to our hospitals may be admitted; you see, there are certain classes of entitlement. A person cannot be admitted unless he is entitled. There are some 25 categories of veterans entitlement under the regulations, and of the ones who have any entitlement I would say 90 per cent try to come to our hospitals, and do come if beds are available.

Senator Hays: Did I not understand you to say, doctor, that you are trying to turn over some of the hospitals to provincial jurisdiction?

The Chairman: Some of them have been already turned over.

Senator Hays: Yes, I know they have. Do you see in the not too distant future many more being part of other hospital schemes?

Dr. Starkey: I think 'undoubtedly within measurable time they will be community hospitals. You see, medically speaking, they are community hospitals. It is administratively that they are not community hospitals.

Senator Hays: I am thinking of—

Dr. Starkey: Medically speaking, the problem is to demonstrate that a given veterans' hospital fits into the health requirements of the region. Sunnybrook Hospital was the first to be transferred. It was a natural. The Hospital Commission of Ontario had done a survey, and found they needed 600 public beds in this particular area of northeastern Toronto. They were faced with the proposition of having to build a new 600-bed hospital for several millions of dollars, or making an arrangement whereby this number of beds be freed in the existing hospital in the area. The University of Toronto wanted increased teaching facilities of a general hospital type. So, everything came together, and the need was easily proven.

But, if you take other hospitals in other cities, you have to see how they fit into the community, before you can really make them community hospitals. They have to fit in in different ways.

Senator Hays: What is your occupancy in the overall scheme of hospitals? What would it run to now?

Dr. Caldbick: About 85 per cent occupancy.

Senator Hays: It is about the same as that of other hospitals?

Dr. Caldbick: Yes. Some are a little higher. I would average it out to about 85 or 87 per cent, which is considered to be about the normal operating capacity of a hospital.

Senator Hays: That is almost 100 per cent.

Dr. Caldbick: Yes, because of the turnover.

Senator Hays: Do you feel, doctor, that research is not a part of your operation in the hospitals, and that perhaps it should not be a part; that perhaps there are places that can do it better, and without duplication?

Dr. Starkey: No, sir. On the contrary I feel the opposite.

Senator Hays: Then, you feel it should be enlarged upon? Do you feel you can do this research in certain areas better than other people can; that you are better equipped to do it?

Dr. Starkey: No, it is partly because of the obligations we have, particularly in the fields of chronic disease. We are obliged to treat the veterans with chronic slowly developing disabilities such as arthritis, rheumatism, and all that group, which includes chronic liver disease and chronic lung disease. We are obligated to do this by the nature of our obligations, and the big classical teaching hospitals of the medical schools find this very difficult to do in this day and age. A person has to be very sick in order to get a bed, and a number of the people we treat are not very sick at the moment. You can do a lot towards, at least, stemming the course of the disease, if not curing it.

Senator Hays: In these areas do you feel that you can do research better than any other agency?

Dr. Starkey: In the investigation of these chronic diseases and their proper treatment, yes.

Senator Hays: Can you spell those out?

Dr. Starkey: Arthritis and rheumatism.

Senator Hays: Do you think you are better equipped, because of the makeup of the patients, to do research into arthritis and—what are the other diseases?

Dr. Starkey: Chronic bronchitis, emphysema, and other chronic lung conditions. There is also chronic kidney disease, which we are coming to recognize as probably one of our biggest killing agents at the present time. There is chronic liver disease and there are the chronic neurological diseases like Parkinsonism—the shaking palsy. These people are not sick, but they gradually become charges of the state because they become helpless.

Senator Hays: How much money do you think you would require to do a good job on this—to do the sort of job you would like to do, and what other countries are doing in this field?

Dr. Starkey: The veterans administration in the States is doing a fair amount for the same reason, but they have a budget of \$52 million this year, and our budget has just been cut to \$350,000. That is quite a difference.

The Chairman: They have more veterans, and more recent veterans.

Senator Thompson: Are not we talking about something which will not continue? On page 10 you say:

The continuation of this policy of hospital transfers will eventually terminate our Research Program as the care and treatment of veterans will become the responsibility of other authorities.

In view of the fact that you think you can do research in these areas better than others you would be concerned about this policy?

Dr. Starkey: Not actually, sir. As I say, the people who take over these veterans' hospitals guarantee to carry on the veterans' care, but they are also going to add to the veterans' care similar people requiring medical care from the general community. That is a medical problem; it keeps right on going.

The Chairman: Do you not think this program could be better integrated into the overall medical research program if that amount of money were to be allocated by the Medical Research Council, for instance?

Dr. Starkey: That is one reason why we submit our research projects to the Medical

Research Council for scientific evaluation. As Senator Carter, I think, brought out, we do have this obligation directly and indirectly to the pension commission and to the care of veterans in the peculiar circumstances.

Senator Hays: You say you think you would be better equipped to do this than other agencies. In the history of your research so far, where do you feel you have made the greatest contribution to this sort of research?

Dr. Starkey: With chronic lung disease the integrated program of Dr. Bates has had quite a lot of international recognition. It is the first time it has been achieved on this scale and done in this way. Dr. Kay made many of the earliest observations on how common the chronic nephritis type of kidney disease was among particularly older people, and at that time it was not realized how widespread it was. He has gone on to other things, but at the time he did this it was because he was working with the type of patient we were looking after and had the facilities and backing to do it.

Dr. Thomson in Winnipeg did, I think, the first definitive work in Canada on certain phases of shock and how to deal with it. The reason he did that was because it started as an investigation into how you looked after the older man in the face of major surgery. Before that it was not realized that you have to have a different approach to the shock an older person gets in major surgery compared with a younger person. It is a little hard to explain.

Senator Hays: Do you not think, Mr. Chairman, it would be useful to the committee when making their report if Dr. Starkey were to document some of these areas about which he feels quite keenly?

The Chairman: Before we go to that, would you care to make additional comments on this question, Dr. Caldbick?

Dr. Caldbick: The only thing I was thinking was that when we said we had better facilities, it is probably not intended to mean we have the best facilities for research but rather the patient population we are looking after, and these are of interest in the fields of the debilitating aging process which are not being followed as much at active treatment hospitals. It is not the treatment facilities but the population.

The Chairman: You mentioned arthritis.

Dr. Caldbick: There was a lot of work done on arthritis in Toronto, more in the treatment line, but it was carried out at Sunnybrook Hospital as a major project when we were operating Sunnybrook.

The Chairman: Has it been abandoned now?

Dr. Caldbick: It will be picked up by the Toronto University, I am sure. We are out of that hospital now, but I am sure there is a continuing program on it.

Senator Thompson: On page 8 you say:

The two biggest hindrances to the effective performance of the D.V.A. research program are the overall deficiency in funds and the continued, well-meant attempts to make the research operations conform to the same rules and regulations, methods and procedures found to be desirable for the general operation of our hospitals.

How is that going to change when you get this transfer? You talk optimistically about Sunnybrook being taken over and say they will continue this sort of research. Will they overcome this second hindrance? Or will they overcome the first one?

Dr. Caldbick: I think I will ask Dr. Starkey to answer that one.

Dr. Starkey: The idea we are trying to convey is that if you are conducting research there is a strong tendency, as I think is well known, to try to make research more efficient, to go in for proper budgeting. In the present drive within government departments for better management techniques, this program has been put under the same general management techniques as have been introduced for the efficient running of services in the hospital. In other words, it has the same restrictions and you are supposed to produce the same degree of planning in your research program as you do for your on-going services. When you get down to operations this is stultifying; you cannot operate research within these narrow limits. It is a philosophy which makes it very difficult to operate. You can categorize—so much for salaries and so on—when you are making your grants, but we have already lost two very good research people just on this. They were told they could not do this, they could not do that, because it had not been

budgeted for a year ahead of time. They could not budget for it a year ahead of time because they did not know what they were going to find. It is very, very difficult. So they just left our service, and one of them, I know, has gone down to Boston.

Senator Thompson: What is the solution, doctor? They are taking over your operation. You pointed out that you are being of great benefit in medical research when you do it as your own. How do we maintain this opening of medical frontiers in the field of veterans?

Dr. Starkey: My concept, frankly, is as the Chairman, Senator Lamontagne, said, that as the management of the hospitals becomes local, the obvious source of funds for the local people is probably the Medical Research Council. So it is a sort of gradual hand-over in that respect, and we feel we are taking the most sensible first step by getting the Medical Research Council to make the scientific evaluations of projects. This is the sort of first step, and then, they are all ready to consider continuations, granting money to somebody else. That is my personal view. I really cannot say I am speaking for the department on that, because I have not the authority.

Senator Carter: I see from page 8 of your brief that inflation has caught up with your program, and you can only get about half the amount of research done for the money you could 10 or 12 years ago. Then, on page 9 you have budgetary troubles and you have to set aside money for equipment.

More and more veterans' hospitals are being placed under civilian administration, provincial administration. What does the future hold for you? Are you going to be able to remain in the research business, or do you think you will have to give it up?

Dr. Starkey: The main problem at the present time is that we have to continue to run these hospitals, and we are doing the best we can to keep on running them as first-class hospitals, until the transfer is made.

There are two points of view on this. One is that it is our obligation to do so. The other is that if you wish to sell something you cannot sell a dead horse; you have to have a going concern. If you take the strictly materialistic point of view, it is much easier to have other people take over a really first-class going concern.

Senator Carter: But eventually if you succeed and these are all taken over by civilian administration, what happens then, do you fold up your program?

Dr. Starkey: As I said, it translates into the field of the Medical Research Council, and we are trying to prepare for this step.

Senator Carter: Some time ago the department undertook a wonderful piece of research into the Hong Kong veterans. They said they had complaints that were different from others because of their treatment in prison, vitamin deficiencies and other things like that. Was your department connected with that research?

Dr. Starkey: Entirely.

Senator Carter: That was done entirely by your department?

Dr. Starkey: Yes, it was all done in this program.

Senator Carter: Are you planning to do something similar with others? I understand the Korean veterans are saying that they have the same argument, that they were subjected to very special conditions, and they are requesting some sort of research into their particular problems. Is that being considered?

Dr. Starkey: I was not aware that they had this feeling. Are these people who were taken prisoner in the Korean War?

Senator Carter: I think even the person in the prison camps. This is attributed to life in prison camps in other parts of Asia too. We singled out the ones in Hong Kong because they were in a bundle by themselves and this was a little dramatic, but the same sort of argument applies to others in concentration camps in Asia, and even Europe, and particularly some of the Korean veterans. There was some question as to whether they should not have their problems researched as well. You know nothing about that?

Dr. Starkey: No. I dealt very actively with the men returning from Korea because we were particularly anxious to see what they were bringing back with them that might trouble them afterwards. So we mounted a very considerable investigation of the men as they returned. But I am afraid I have not heard anything about the prisoners.

Senator Carter: I do not see in your brief very much reference to the work done on the

Hong Kong veterans, which was a dramatic piece of work, I thought. Have you made much reference to it here?

Dr. Starkey: It can be found. It was pretty early, and it was pre-1962, and most of the brief has been founded on what has happened since 1962.

Senator Carter: Oh, I see.

Dr. Starkey: The main work was done on the neurological side by Dr. Miller Fisher who was a neurologist and neuropathologist. He did a very remarkable piece of work, and this has since been applied to many other deficiency diseases.

Senator Carter: I understand the United States have made use of your findings.

Dr. Starkey: When he produced his rather masterful findings the Veterans Administration in Washington lured him away to Boston, and he has been running investigations for the V.A. ever since. They set him up with a research institute, that we could not do, and they gave him \$2 million to get set up. So he moved and we lost him.

Senator Carter: Who is doing the research on artificial limbs? There is a tremendous field for research there. The Russians seem to be leading in that field. Are we doing any similar research? Do you know of any research going on?

Dr. Starkey: Yes, we do.

Dr. Caldbick: We have two currently operating projects on prosthetics. You know that service has been transferred now to the Department of Health and Welfare. We have one project in Toronto under Dr. Harris, and one in Halifax under Dr. Noble. These are continuing projects.

Senator Carter: My final question, and then I will give somebody else a chance: It seems to me you have a group of veterans who are chronically ill and you have them available to you from the First War, and now you have another batch coming on from the Second War. It seems to me there should be a wonderful opportunity there to do research into the process of aging. Is that too big a thing for you to tackle, or are you thinking about it?

Dr. Starkey: We are thinking about it all the time, sir. The difficulty is that when you come to analyse it you have to be pretty

careful what you mean when you say "aging". Aging, really, is a natural process, but what we are dealing with medically is always abnormal aging. We are always dealing with a disease process. We are not dealing with normal aging. So, when I refer to the investigation of chronic diseases there is a tendency to say that we are investigating the aging process. We are not. We are investigating abnormal aging caused by slowly developing disease processes. So, with that qualification I would say that we are continually interested in aging.

Senator Carter: We figured out the war veterans allowance on the basis that the veterans were in a theatre of war which caused them to age ten years earlier than ordinary people, but they have fooled us because the average age of veterans today is over 70. They are still ahead of the game.

The Chairman: That is because of the success of the research.

Senator Carter: I do not know whether we can say that, but I read an article the other day which said that animals live six times longer than human beings in order to reach maturity, and on that basis a man should live to be 150. We are only half way there. This seems to be a big field that we can explore. You may have a number of men with an average of 75 who are suffering a disease that you are investigating, but you are still investigating age as well, I think.

Dr. Starkey: Yes, but it is exceedingly difficult to investigate aging on the strictly normal basis. I think you have to turn to these very isolated corners of the world such as the Caucasus where people of 120 and 130 years of age are reported. Most people there are really aging normally, and they are not exposed apparently to disease.

The Chairman: They are close to nature, like animals.

Dr. Starkey: If we really want to introduce a study of normal aging we would have to move to an area like that—to a Shangri-la.

Senator Thompson: I sense some frustration in your brief. At page 9 you say:

If, as some accountants advocate, this segregated equipment money has to look after all purchases of more than \$50.00 nearly all research projects would, in effect, be prevented from using the funds granted . . .

When you are doing medical research and you decide on a project, do you get an allocation for five years so that you can really set up your program, or do you get the money for just a year, and then have to account for every small item?

Dr. Starkey: You have to account for everything every year.

Senator Thompson: Does this mean that the researcher is spending a portion of his time filling out forms rather than doing his research work?

Dr. Starkey: A very considerable portion.

The Chairman: Do you have more limitations or restrictions than the people who receive grants from the Medical Research Council?

Dr. Starkey: Yes, sir.

The Chairman: You have more?

Dr. Starkey: Yes, sir.

The Chairman: Because you are within a department?

Dr. Starkey: This is under the new regulations. We did not have to do that for the first 15 years. This is new.

Dr. Caldbick: I would like to correct something here. It is not \$50; it is \$500. This amount of \$50 applies to the inventory control at the hospitals. We have been told that our equipment accounting is for items over \$500.

The Chairman: Is this as a result of the so-called improvements resulting from new managerial techniques?

Dr. Starkey: Yes, sir.

Senator Thompson: I am asking you this question because I assume you have handled research projects. Do you find this crippling to a certain extent from the point of view of the time of your research people? Would you like to have a five-year allocation of funds, and not have all of this detail?

Dr. Starkey: Frankly, the objective of these new regulations is increased efficiency, but at the operational level of research it is doing exactly the opposite. It is hobbling people in such a way that the money cannot be used to the best advantage. Where we have restricted funds we badly need the freedom to use them, with proper controls and proper judgment, to the best advantage. The more you

are hobbled by minute regulations the more money actually is wasted in the long run, especially in a program where you cannot completely foretell what is the best thing to do. You may have a grant to support you with a laboratory and two technicians, but the way the work evolves during the course of the year makes it of far greater advantage to have a new technical device which would be more accurate. It may be that you can still stay within your budget but you need \$2,000 worth of gadgetry, which will enable you to discontinue the employment of one of the technicians. With these types of regulations, where you have to foretell all this and commit yourself to it, you do not have that freedom of action. We used to have it, but we have lost it in the last...

The Chairman: Has this been imposed on you by the Treasury Board, or by the department?

Dr. Starkey: It stems from the Treasury Board, I believe.

Dr. Caldbick: Oh, yes.

The Chairman: So this would apply more or less throughout the departments in similar cases?

Dr. Starkey: I do not know...

Senator Hays: How do you handle this when you are making up your research budget? Do you say that you want X dollars, or that you have some program that you need a lot more money for? How do you arrive at this particular budget, year after year?

Dr. Starkey: It is set by Treasury.

Senator Hays: When your department goes before your minister and says: "We have come up with what we think is something that will really cure emphysema, but it is going to cost \$5 million. We have the know-how and everything else", you do not use this approach in so far as research funds are concerned, do you? You do not say: "We had \$109,000 last year and we want ten per cent more this year". How do you handle the budget? It has been deteriorating, and I am wondering whether you have been selling programs, or asking for money.

Dr. Starkey: I am sorry, but I am not really competent to answer that, because I have never sat in on the final budgetary...

The Chairman: But do you have enough money at present to satisfy most of the worthwhile applications you receive?

Dr. Starkey: No.

Senator Thompson: When you go before Treasury you never have a real guarantee that you are getting this money for five years. You get the medical scientists together and you get the staff together, and then when you come back the next year they might say: "Look, we are going to cut this by 10 per cent", so these scientists have no security in respect to completing the job. Am I right in that?

Dr. Starkey: Yes, except for one thing. As I have tried to bring out in the brief, most of our operations are not run with full-time people; the full-time people are mostly technical assistants or research assistants, not principal researchers. There again, that is intimately bound up with the total amount of money available. We have not been able to support full-time research people. We have one excellent person at Queen Marys in Montreal, a Dr. Murphy, but we could not support all her research. It is an MRC grant and she is an MRC research associate. She gets \$22,000 approximately from the MRC. She works full-time in the DVA hospital and has two assistants; we provide the room, we provide a lot of the apparatus, which we can within our order of granting, but we could not support her.

Senator Thompson: This is not just one case, as I understand it. I have heard that even at Sunnybrook a top person was attracted but when he looked at the sort of ancillary research facilities he said, "I can't possibly do this job" and left. Is the example you gave at Queen Marys in Montreal a prevalent situation?

Dr. Starkey: I think you are always faced with that. You never have enough money to go round. No matter how much you have got you cannot look after everything.

Senator Yuzyk: I think we can challenge the statement about having enough money, because we have had witnesses here who have stated they get money in certain fields which they call basic research, and they allow full scope to certain individuals and programs and then wait for the results. Have you a continuing program that requires expansion, for instance?

Dr. Starkey: Yes.

Senator Yuzyk: Were you turned down or limited in the scope of your research? Did you have to discontinue research because they did not consider it was fundamental enough or applicable enough? Somebody is making a decision for you here rather than yourselves. This is what it looks like to me.

Dr. Starkey: The decisions have all been financial.

Senator Yuzyk: Financial?

Dr. Starkey: Yes.

Senator Yuzyk: We understand that. This is basic here. I have come to the conclusion in our discussion that probably the, say, Medical Research Council do not consider DVA as a good research establishment. I would like them to say this is not so, but I imagine you must have some co-ordinating programs right across Canada to carry on research, because one thing leads on to another. We know that sometimes there is a major breakthrough and if you have not got the money you are limited. Have you been turned down on certain programs that you considered were essential? Because of financial limitations have you had to drop some of the programs?

Dr. Starkey: Yes, I could quote a few. It was partly a question of money with Dr. Miller Fisher, to whom we referred, in connection with neuro-pathological work. If we could have provided him with adequate basic laboratory facilities for carrying on he would have stayed with us, he would not have moved to Boston. He did not want \$2 million necessarily, but at that stage the money just was not there.

Senator Yuzyk: You are hamstrung in some places.

The Chairman: At the same time ex-Minister Hays was trying to kill a project in agriculture and did not succeed.

Senator Hays: It was no good.

Senator Thompson: We seem to spend more money in Canada on plant life or some kind of wheat than we do on human beings.

Senator Yuzyk: This is of some concern to us because we are dealing with human beings, and mainly here with veterans who have made sacrifices for their country. I can see DVA having a long-range program that is necessary to carry on basic research, even to

give full scope to full-time scientists or medical scientists in biology, bacteriology and related fields. It seems to me that you are constantly limited. Will the Medical Research Council take over all your research work? Is that the objective?

Dr. Starkey: That is my interpretation of the future. There is one thing I should like to refer to, sir, and that is the fact that there never has been an idea, even when this program was initiated, that we would be going into basic research. The idea always was that in effect we were aiming at clinical research concerned directly with the patient and his disease, not with the full-time scientist really digging down into basic research. We never felt this was a role suitable to our hospital organization. But there is a big field of clinical research, and some of you may have seen the considerable survey last year done by the Medical Research Council on medical research in Canada. They say in that survey that they feel there is room for the development of exactly what we have been concentrating on, namely clinical research, the study of the disease in the patient and what can be done about it.

Senator Yuzyk: This would seem very important to our committee in considering what types of research should continue, what types of research you would recommend, that you consider are necessary. I think it is up to the Government to provide the funds for what I consider to be essential clinical medical research. I would even go further and say that you do need some basic research at some place. Unless you allot it to some other institution somebody has to carry it on. This is all direct applied research having direct results that we can see, and every year, or periodically, you could publish it so that we would know the benefits of such a research program. Yet it seems to me you have been narrowed down to almost the bare bones, so to speak, now.

Dr. Caldbick: I think what Dr. Starkey has said is quite true. The way it has worked in the past, up till last year, actually, is that each of the units operating a research facility were given an allotment of funds based on the expenditures of past years. When you are estimating you have to have something to go by. So, in the estimates we put in X number of dollars which is considered sufficient to cover the program, plus the increasing costs.

We are now trying to change this policy of allotting funds directly to a unit and saying, "This is the amount of funds you are going to have, and you have to shape your program around that." This has been the case all along. Our first step is to try to improve the standard of project applications that are coming in and pick out the good ones. To do this we have negotiated with MRC to see whether they would do a scientific review and appraisal of our projects, instead of duplicating review bodies. Dr. Brown agrees to this in principle, but it has to go through his executive council for approval.

In the future when we get a scientifically sound project, one which has good prospects, I do not see this limitation is going to pertain, because we will have something to go to the authorities and say, "We can do it, if we have the funds." But that has not been the case until just this year.

Senator Hays: Something to sell?

Dr. Caldbick: Yes, and some projects are mediocre and some are good, and I think this will standardize projects in the future. If a man comes up with a bright idea that he can cure this or that, and it will cost \$5 million, maybe we will have a little more armamentarium with which to go to Treasury Board.

Senator Thompson: But you will not go to Treasury Board: you will go to MRC, and they will go to Treasury Board.

Dr. Caldbick: This goes back to the business of phasing out our hospitals. This is government policy. The Glassco Commission said we should get out of the hospital business, and this we are doing gradually. This is going to take a period of time, and until the hospitals are transferred we should try to improve this program as much as we can by having some method like this to get a good scientific appraisals and not limit the units by saying "You have \$120,000 to deal with all your multiple projects this year". Then they just had to cut the cloth to fit.

This way I hope we might be able to improve the quality of our projects and go to the authorities and ask for more money.

Senator Thompson: Do you have representation on MRC?

Dr. Caldbick: Dr. Brown, the Chairman of MRC, is on the Director General of Treatment Services Advisory Board. We are invited to attend some of their meetings. Quite a while

ago, when I was associated with the Defence Research Board, we had an unofficial committee in which we met with Health and Welfare, MRC, DRB and DVA—representatives from each. The basis of this Committee was to try to standardize application forms and the administration of grants. But another very important part was that we transferred applications. We might get an application, say, that was directed to DRB but had nothing to do with defence, but which was an excellent project for another agency, and we would transfer it—we called it a horse-trading committee. People have become better oriented and they apply, in the main, to the appropriate agency. I was talking about a few years ago.

I think the investigators are becoming more aware of it, but we are going to adopt the MRC application form this year. We have already sent them out instead of our own. I think the MRC is better organized and will provide an easier way of reviewing them through their 12 expert panels.

Senator Carter: DVA discontinued its medical bulletin some time ago.

Dr. Caldbick: Yes.

Senator Carter: Is that a casualty of your retrenchment program?

Dr. Caldbick: It was an organ through which our people had easy access to publication. There were a lot of other things. Actually, it was because of shortage of staff that we had to discontinue it. I am speaking out of turn in this because I have had nothing to do with the medical bulletin; this is in another department, but it comes under DVA. We attempted to transfer it to Health and Welfare, so that they might continue it, but this did not work out very well.

Senator Carter: There is one point I am still not clear on. I want to go back to when the DVA hospitals are phased out. How will you then maintain control over the kind of research you want to do?

Dr. Caldbick: We will not have any research programs.

Senator Carter: There will be no research oriented particularly to veterans' diseases?

Dr. Caldbick: Not under the aegis of DVA, because we will not be running the hospitals. But the patients will still be available, and it

is this type of patient we hope and feel the investigators will be interested in; and research will be continued. There will be the same hospital staffs because it is a transfer of administration only. However, we will not have any clinical facilities in these hospitals. We will retain a small administration unit for eligibility and accounts; that is about all—as we have already established such at Sunnybrook, Ste. Foy; and Lancaster, in a year or so.

Senator Carter: Do you think there will be present the same influences that caused you to start these programs? Do you expect those same influences to exist in the other set-up?

Dr. Caldbick: I would certainly hope so. I cannot guarantee that because this is looking into somebody else's interests, but I would certainly hope they would. We will continue to operate this program, we hope, maybe on an improved scale, until such time as these hospitals are transferred to the provinces or other corporate bodies.

The Chairman: Out of the total amount of money you are spending now, what proportion would you say you are spending on or devoting to psychology and sociology?

Dr. Starkey: Currently it is approximately \$20,000 a year.

The Chairman: That is a very small amount.

Dr. Starkey: Yes.

The Chairman: \$20,000 out of a little more than \$400,000. How do you handle these applications? Do you have sociologists and psychologists on your boards or committees?

Dr. Starkey: Yes. The big start has occurred in Montreal. There the advisers in this field are: Dr. Cleghorn, who is director of the Allan Psychiatric Institute; Dr. George Ferguson, who was the chairman of the Department of Psychology at McGill and who was also a bio-metrician; Dr. David Solomon from Sociology and Anthropology; Dr. Ciale, who is a psychologist at the University of Montreal and who has actually been specializing in criminology but who has moved over into the general sociological field; and Dr. Shiner, who is the Director of Research for the School of Medical Social work. They formed a sort of advisory committee, as I say in the brief. In the last two years. They have been supervising the work of graduate students

—I have forgotten the exact numbers now, but we had 19 people working on their Ph.D. or M.A. theses engaged on different facets of the research problems and, so to speak, providing building blocks for the greater structure. This is what we would like to develop.

We pay half of Dr. Lella's salary at McGill, and they pay half. He works half-time at St. Anne's, and has done quite remarkable work. Quite unexpectedly he had financial difficulties. We certainly kept paying his salary, but he wanted to expand and needed more funds, and recently he got a Canada Council grant of about \$12,000 which keeps him out of the hole. It was rather a surprise to know that the Canada Council was coming through on that.

The Chairman: They have more money now. But, \$20,000 per year means not very much more than a pilot project.

Dr. Starkey: That is right.

Senator Belisle: Mr. Chairman, I should like to ask the doctor if, in the light of what he has said, it is possible for projects which have been carried on by other agencies to be charged back to him. You mentioned a while ago that doctors were working in Montreal and providing the facilities. Is that charged back to you? Are other departments engaged in studies or research for you, and charging the costs back to you?

Dr. Starkey: They do not get any money out of us.

Senator Belisle: They do not?

Dr. Starkey: No.

The Chairman: In that case the doctor had received a grant from the Medical Research Council?

Dr. Starkey: We are providing the facilities. One of Dr. Jacques Genest's research Fellows was interested in our hypertension clinic. It was the only place where he could get the documentation on people which went back a sufficient number of years. Of course, that is another big advantage of the veterans' hospitals; the documentation has been kept up for many years, and you can look back at the natural history of the disease and get a better idea of whether your new treatment is really getting anywhere. Jacques Genest's work on aldosterones could be facilitated by his research man's drawing from our clinic. That

never appeared in the books. Jacques Genest had his own sources of funds, and he was paying his research fellow while working in our hospital.

But, all of these programs are intimately connected with university departments, and that is why I say there is no reason to feel that because the administration, or the responsibility for the administration, of the hospital changes there will be any change in research because you are going to carry on with the same people treating the same patients, and making the same interest in the same fields of disease. Personally, I do not see that there is any problem.

Senator Belisle: The reason why I asked that is because I was trying to find out if there was more than one reason why you are being phased out of research. Presumably there is an economic reason for phasing you people out, and it would be because they were charging you...

The Chairman: Did the creation of the Medical Research Council have something to do with this? Would the fact that your budget has not increased materially since 1962 be a factor?

Dr. Starkey: I do not really know, sir, what the answer is. I have been dealing with the program that I was largely responsible, in the first place, for getting going in 1950. We have had repeated briefs submitted for increasing the financial support.

Senator Thompson: Who do you submit your brief to?

Dr. Starkey: To the Director General...

The Chairman: To the minister and the Treasury Board.

Senator Hays: The minister has to present the program. Is this not right? It depends upon how good a salesman he is.

Senator Belisle: Is your minister a member of the Treasury Board?

Senator Connolly (Ottawa West): Do not answer that question.

The Chairman: They all appear before Treasury Board. I was a member of the Treasury Board for two years.

Senator Connolly (Ottawa West): It is all right to answer that question in the past, but not in the present.

Senator Thompson: MRC is going to be handling the allocation of funds for research. The MRC reports to the Minister of Health. As a person who has been very active in research are you happy with this setup, or would you like to see a change? Let me give you an illustration. The Science Council reports through the Secretariat to the Prime Minister.

The Chairman: What council?

Senator Thompson: I am talking of the MRC, and they report to the...

The Chairman: They report to the Minister of National Health and Welfare.

Dr. Starkey: I thought that that had been rescinded.

Dr. Caldbick: No.

Senator Thompson: You are going to have to put all of your faith in the MRC. Do you look with confidence to the future in respect of getting funds, or have you an idea of another kind of set up you would like?

The Chairman: They have been pretty successful in recent years in increasing their budget.

Dr. Caldbick: I think this will depend upon the quality of the projects submitted from our hospitals. If they stand up with the projects that MRC are granting funds for, then we should get support for funds. If they say that we have a scientifically sound approach that should be investigated, then I think this is the ammunition we need.

The Chairman: That is, if MRC says that?

Dr. Caldbick: Yes.

Dr. Starkey: It depends on the MRC standards, if I might disagree with my colleague.

Senator Thompson: You are dealing with your peers. You will be talking as one doctor to another.

Dr. Starkey: Yes. There are differences in points of view. Dr. Farquharson, who was largely responsible for having MRC set up in its present form, was our original adviser for medicine in DVA. Five of us were given the job in 1945 of making something of these hospitals, and Dr. J. MacFarlane, who was a surgeon and afterwards Dean of Medicine at Toronto, and myself, and Dr. Jules Gosselin

from Quebec City, who is a radiologist, worked very closely with Dr. Farquharson all the way through. Dr. Farquharson himself always wanted the MRC to take an active interest in what we call clinical investigation. It has always been a question of relative emphasis. When the MRC says, "Yes, this has a high priority of scientific validity", you have to be a little cautious about what they mean, because this is a comparative term. They may be talking in terms of basic science or they may be talking in terms of what we call clinical investigation. The fear in the minds of the practising physician and surgeon who wants to do investigation of a clinical type is that his confrères, who are very distinguished scientists, will say, "This is not a scientific problem". It is a difficult thing.

The Chairman: Or say it is trivial.

Dr. Starkey: There is not any ill will and it is not politics. It is the conviction of the person as to what is valid and what is not valid.

Dr. Caldbick: In a recent report they have stated that more emphasis should be given to the clinical side and investigation.

Dr. Starkey: That is what encourages me. In the report to which I referred, which they published last year, there are several references to the fact that this type of clinical investigation by people who are treating and teaching is important and should be expanded.

Senator Carter: Are the programs for psychiatric research at Queen Marys and at Westminster integrated? Is that the type of clinical investigation you have in mind? It is geared to one particular patient all the way through.

Dr. Starkey: It is integrated to the extent that the advisor for psychiatry, Dr. Dancey, is always in close touch with the program at Westminster, although he works in Montreal. They try as far as possible to complement each other.

Senator Carter: Have you had any results that you can report?

Dr. Starkey: Oh yes. There has been a very considerable impact. Dr. Dancey and Dr. MacPherson, who was a younger man very active in setting up this Montreal psychiatric study unit and has recently moved as professor of psychiatry at McMaster at Hamilton, presented a report last year at the Interna-

tional Congress in Psychiatry held in Madrid, which has been quite widely quoted. It is all based on studies of dependency and the effects of welfare on creating dependency, quite unintentionally. This has all emerged from this type of study.

Senator Thompson: I notice that in the Treasury Board they have two scientists. I do not think there is any medical person within the Treasury Board to interpret it. Do you see that as a helpful move when applications are made?

The Chairman: He would feel very much alone there, although he might find some patients!

Dr. Starkey: I think it is fair to say that I personally think the most sensible thing is to concentrate everything in the best organized body, namely the Medical Research Council. Whether or not in the opinion of the operational person such as myself in the field the Medical Research Council places too much emphasis on pure research or basic research as opposed to my interests in the operational field, we have just got to work it out for ourselves. I am quite willing to argue with

them. It is hard to picture a complete dropping of the program immediately. I think this scheme to which Dr. Caldbick refers, of first of all submitting our projects, putting them through the same process of assessment by the same expert committees, is the sensible first step. Then we can consider what we should do next. In the meantime we are desperately short of funds, and I think these funds are very largely calculated on the basis of the diminishing patient load, or various formulae of that type. If you have fewer patients you do fewer research projects. I am not very sympathetic with that point of view but I think it is probably calculated on that basis.

The Chairman: On behalf of the committee, I wish to thank both of you very much for being with us this afternoon. We have been greatly interested in your operation. If our work here continues I do not know whether we will see you again. Perhaps you will have evacuated the field completely when we come to make a review of your operation next time. Meanwhile, again thank you very much.

The committee adjourned.

APPENDIX 12.

Submission of
The Department of Veterans Affairs
to the
Special Committee on Science Policy
of the
Senate of Canada

November
1968

Medical Research Activities
of
The Department of Veterans Affairs
Parts I and II

Submission of the Department of Veterans Affairs
Medical Research Activities
to the
Special Committee on Science Policy
of the
Senate of Canada

November 1968
Ottawa

Part I: Summary of main objectives, conclusions, and recommendations.

1. The original objectives of the D.V.A. clinical research programme have remained valid since its inception in 1950. The objectives may be summarized as follows:

- (a) To create conditions in our hospitals whereby able, forward-looking clinicians, medical scientists and para-medical scientists are given the opportunity to explore new ideas on a full time or part time basis.
- (b) To favour and promote the investigation of diseases and disabilities that are associated with hazards of military service, either as direct consequences or as indirect consequences as individuals grow older.
- (c) To promote, in collaboration with university medical schools, the pursuit of investigations that are valuable adjuncts to educational, Training programmes.

2. In essence the maintenance of an adequate intramural research programme is essential if our hospitals are to continue to operate first class services, for the care of patients, utilizing first line attending staff in charge of good residency training.

3. It should be noted that while our research programme has not had as a declared objective, the creation of full time career researchers, neither has it operated against this principle. The aspirations and capabilities of individuals have been used as guidelines and whenever the support of research careers has been indicated, ways and means have been explored in collaboration with universities. The very limited funds available for research in our hospitals have made it necessary to turn to other granting bodies for the support of more senior salaries while D.V.A. funds are devoted to supporting the tools, facilities and technical assistance.

Conclusions re Objectives

4. In relation to objective a) - as pointed out by Middleton 1954, the professional and scientific staff have been maintained at a high level of professional capability since 1945. Up to the early fifties, patriotic motivation and direct personal interest in fellow veterans were major

factors in recruiting and keeping A 1 staff -- following this period the addition of an active research programme dovetailed with development of closer liaison with medical schools for post-graduate education, created an added incentive to younger physicians to remain in the community. Thus the retaining of older, able teachers and younger progressive physicians assured the continuation of first class Treatment services. Over the whole period at least 35 senior men of outstanding caliber have stayed with the Department as directors of services or heads of departments largely because research and development was made feasible. Over the last five years records show that 68 younger medical men have worked actively in our research projects, 23 on a part time basis and 45 on a full time basis.

5. In relation to objective b) - The interest in disabilities directly relateable to military hazards has declined as the years have passed since 1945. The direction of interest in terms of our aging patient load has focused more and more on slowly developing disease processes, such as arthritis and rheumatism, chronic diseases of lungs, livers and kidneys, and cardiovascular and nervous systems. Particularly in the last five years since public hospitalization schemes have created grave bed shortages in large teaching hospitals, the facilities for hospitalization of victims of less acute diseases have almost disappeared. It follows that in many medical centres active research in these areas can best be promoted in veterans hospitals. Currently of our 67 fully planned research projects 30 represent investigations of such chronic diseases.

6. In relation to c) - Apart from the conclusions relating to a) and b) wherein those taking part in the research program are all involved in one way or another with teaching and training programmes of medical schools, in certain areas there is a growing tendency to have post-graduate students working for Master's degrees or doctorates take a very active part in specific phases of a project for the production of their required research theses. The Psychiatric, Psychological and Sociological group of investigations in Montreal in the last two years have had 3 Ph.D. candidates, and 10 Master's degree candidates from both McGill University

and the University of Montreal departments of Psychiatry, Psychology, Sociology-Anthropology and Medical Social Work. Additionally in Montreal three other candidates have Master's degrees in investigative medicine and have worked full time on other projects.

Part II: 2.1 Organization

a) Attached as Appendix A is a block diagram which indicates the Head Office organization and the hospitals that have been involved in the D.V.A. Medical Research Program.

The units shown in solid lines are the hospitals where Research is currently being conducted.

The units shown in broken lines indicate hospitals in which a Medical Research program was formerly conducted but has now been terminated. The dates shown represent the closing out of the Research Program.

b) The only formal reporting channel that exists between other Federal agencies, is by representation from Department of National Health and Welfare, Medical Research Committee and Defence Research Board on the D.G.T.S. Advisory Board on Medical Research.

c) Attached as Appendix B is a block diagram showing the organization of the Medical Research Program at the units conducting a Medical Research Program.

d) N.A.

e) N.A.

2.2 Organizational Functions

a) Implementation of the Research Program

The authority to engage in Medical Research and Education was granted to the Department of Veterans Affairs by the Privy Council Committee on Scientific and Industrial Research, January 9, 1950. The clearance for the expenditure of funds followed in the authorization of the Treasury Board, April 19, 1950. By the terms of reference the Medical Research under the Department of Veterans Affairs was expressly directed to the treatment of veterans. The Department was deemed the appropriate agency to undertake such clinical research. Moreover, the Department was

instructed to establish the necessary facilities for the conduct of this plan. Specific projects arising within a given hospital are reviewed by the Hospital Committee on Medical Research. If approved by this group, they are submitted to the Head Office for the disposition of the Advisory Board for Medical Research and Education. This Board of representative physicians, with the Director General of Treatment Services as chairman and the Director of Treatment Administration as permanent Secretary, has the immediate control of the Research Program.

Provision for the subsidy of basic research in universities was made to supplement studies in institutions of the Department. Coordination among the several government agencies interested in research has been attained by a committee composed of representatives of the Department of Veterans Affairs, Medical Research Council, Department of National Health and Welfare and the Defence Research Board. The Director of Treatment Administration acts as the representative of the Department on this coordinating committee.

2.2 b) Functions - Essentially an intramural programme

In the original submission from the Minister of Veterans Affairs to the Chairman of the Privy Council Committee on Scientific and Industrial Research (14 August 1947) it was requested that the building up and coding of good medical records should be considered an essential foundation for future clinical research although such could not be separated financially from the costs of proper care of the patients. By 1950 it became obvious that separate funds should be made available every year for the support of specific research projects that should be planned to be pursued intensively for limited periods of time without making continuing commitments for additional staff or facilities. Each such project would be re-assessed and monies for grants re-assigned yearly. A partial exception was made in five larger hospitals where nuclei for special studies on patients were created as Clinic Investigation Units. These units consisted of ward conditions for close control of patients under study plus ancillary laboratory facilities free from routine patient-care commitments. These units, in practice, were more or less guaranteed continuity although their

activities were reviewed yearly and it was understood that non-productivity would result in closure or forced reorganization. At the time of their inception such units were not generally recognized across Canada although analogous organizations had been running in some medical centres for some years (e.g. in the Royal Victoria Hospital, Montreal, the Rockefeller-founded "University Clinic").

The support of the Clinical Investigation Units has been continued since 1950 although the financing has been modified from time to time. As their usefulness in providing specially controlled conditions for the assessment and treatment of problem cases met with in any of the general treatment services of the hospital, has grown greater and a greater share of the total running expense has come to be borne by the general funds of the hospital. Alternatively, additional research funds have been allocated to the units on a non-continuing basis from time to time because of particularly significant work being undertaken. Currently approximately 50% of the total unit expenses are borne by "general funds" and 50% by "research funds".

Because individual projects tend to rise or fall with the availability of competent, enthusiastic workers, the support of individual projects has shown marked fluctuations in the different hospitals. Decisions as to support or refusal have been based on several factors, roughly in the following order of weighing:

- scientific validity of the proposals.
- applicability to medical problems met with in DVA hospitals.
- in terms of local conditions, the proposals' potential for stimulating attending staff, resident staff or post-graduate students.
- the general educational value of the type of work to be undertaken.
- local needs for stimulating or modernizing the outlook in an important scientific or clinical specialty.

2.2 c) In the case of the federal agencies the relationship has already been described under 2.2 a) above in that there is a committee set up representing the other federal granting agencies and this department is represented by the Director of Treatment Administration. This is an unofficial committee which was designed to standardize such things as project applications, reporting form, etc. It also provided a means whereby one agency could transfer project applications to another department which it was felt was more appropriate for the particular application involved.

The relationship with the educational institutions has also been partially described above in 2.2 a) in that a provision for the subsidy of basic research in universities was made to supplement studies in institutions of the department. As our program is more or less dependent on the support from university staff personnel, there has naturally developed a close liaison between the Medical Faculties and the DVA Research Programs.

2.2 d) Although certain "Units", such as the five C.I.U.'s and the Psychiatric Research Unit at Q.M.V.H. have been accorded priorities on the allocation of funds, definite projects operated under their auspices and with their facilities have been reviewed annually for continuing support of the unit. All other projects have been reviewed annually and the funds available have been distributed in accordance with the rating factors outlined in 2.2 b) above. Prior to 1964 the responsibility for comparative ratings rested with the D.G.T.S.'s Advisory Board, but, since then, comparative ratings have been handled locally within the research budget allocated to each hospital. To do this rating, in one hospital an independent Advisory Committee was set up with membership from two universities; in two hospitals there have been mixed committees of senior hospital staff plus university staff; in the other hospitals the rating has been done by senior hospital staff. In all three systems specific, expert opinions have been sought from independent referees when necessary. Finally all local proposals were referred to the Director General for confirmation or rejection.

In the current year the Director General is trying to introduce more uniformity into the assessment system and has made tentative arrangements with the Medical Research Council for obtaining a scientific rating on all DVA projects by submitting them to expert committees of the M.R.C. In these new proposals there remains a hiatus in the Psychiatric-Psychological-Sociological field in that the M.R.C. have not been dealing with these areas up to now. This is an extremely important field to our department, dealing as we do with the attitudes of patients towards pensions, their disabilities and long term hospitalization for various degrees of disability. This also takes in all phases of motivation and reactions to rehabilitation efforts including such conditions as chronic alcoholism.

2.2 e) A major survey was undertaken in 1954 by Dr. William Middleton, Dean of Medicine, University of Wisconsin. He produced a detailed report of the programmes in each of our hospitals and, while approving of the general planning, made many specific suggestions for improvements at the local level including more active liaisons with appropriate university departments for planning and for promoting interest in challenging fields.

2.2 f) The Department of Veterans Affairs for the last 18 years has seen a steadily increasing decentralization of medical practice in that each hospital's policies and modes of practice have become more and more integrated with local conditions particularly where our institutions are closely attached to medical schools. This process has militated against the organization of Canada-wide cooperative investigations such as were envisaged as being of prime importance when the programme started. Only one cooperative investigation, involving four hospitals, has been organized successfully in the last five years. This is the continuing project directed by Professor David Bates, McGill University, studying Chronic Bronchitis in Halifax, Montreal, Toronto and Winnipeg, with highly specialized collaborators in each centre.

The interchange of information between different centres when such information stems from investigations of problems affecting the care of veterans, has continued to depend upon reports and discussions at scientific meetings such as those of the Royal College of Physicians and Surgeons, the

Canadian Federation of Biological Societies, etc. Proposals for organizing meetings of investigators from D.V.A. hospitals, akin to meetings held annually by the Veterans Administration US., have had to be refused because of lack of funds. This lack of opportunity for people of similar interests to get together to discuss current work and future plans, has hindered efforts to promote coordinated studies to which several hospitals might contribute.

2.2 g) The two biggest hindrances to the effective performance of the D.V.A. research programme are the over-all deficiency in funds and the continued, well-meant attempts to make the Research operations conform to the same rules and regulations, methods and procedures found to be desirable for the general operation of our hospitals.

By the time the DVA Programme was well established in 1956, \$375,000.00 was made available for grants. For 1967-1968 the total available had advanced to \$400,000.00. In the intervening years the great advances in technology and marked increases in salaries for technicians or other assistants, have increased costs so much that current funds can only support about half the research activity that was possible 10 - 12 years ago. Enthusiastic and able investigators in our hospitals have, perforce, been driven to wasting a lot of time and energy in hunting for necessary funds from a wide variety of other granting agencies. In the last year research workers in our hospitals have received \$109,000 from other agencies. In addition to these funds from other sources a certain amount of money is expended by every hospital in aid of the research programme, as a charge against patient care. The border between expenses attributable to research and expenses that benefit the patients under treatment is not an easy line to define, but there is no doubt that year by year as research support has been reduced the line of demarkation has shifted in favour of conserving research funds as much as possible. One example may be cited in the staffing of the C.I.U.'s where, in 1956, the special nursing and dietary services were paid for out of research funds while currently such are supplied by the regular hospital services.

The second major hindrance involving the administration and planning of research activities is more difficult to define in that the summation of minor difficulties create one major difficulty. Scientific support personnel are supposed to be placed in positions that are defined and graded by the Public Service Commission. Each hospital is assigned an "establishment" of so many technical or scientific positions that are supposed to accommodate whatever assistants are needed for the research programme. Although research funds may be available, these positions represent a man-power ceiling not only as to total but also as to type. In the current year a further restriction has been introduced whereby part of the research funds have to be segregated into an untouchable equipment account. Predictions were requested in June 1968 in terms of budget planning for 1969-70 (i.e. - six months before research applications are received and grants made). If this equipment account can be reserved for really major pieces costing over \$1,000.00, this type of budgetting can be set up by March 1969 for the 1969-70 fiscal year, but not before then. If, as some accountants advocate, this segregated equipment money has to look after all purchases of more than \$50.00 nearly all research projects would, in effect, be prevented from using the funds granted to the best advantage in the course of the year when new ideas or techniques offer unanticipated opportunities for pursuing the basic investigation in hand.

In summary, in order to administer the research programme properly the total research budget should be made adequate to pay from the one source what is now collected in bits and pieces from several sources. Secondly, it should be clearly recognized as a principle of administration, that because grants are made on a yearly basis and because the types of expenditure in a grant can only be predicted in three broad categories (salaries, major equipment and running expenses), the detailed budgetting, the careful definition of qualifications and numbers of assistants according to practices of the regular Public Service that suit general hospital operations, are not suited to a research programme. Needless to say, anyone who could make accurate detailed predictions of everything needed for 18 months of research would be pursuing the known rather than the unknown.

2.2 h) The major change in the organizational functions that are forecast which may have a marked effect on the D.V.A. Research Program is the fact that it has been established as government policy, on the recommendation of the Glassco Commission, to transfer all D.V.A. hospitals to the Province or other corporate boards. This has actually taken place in the case of Sunnybrook Hospital, Toronto, Ste. Foy Hospital, Quebec, and negotiations have been completed for the transfer of Lancaster Hospital, Saint John, N.B., by the 1st of July, 1970, or at a later date as mutually agreed to by both parties concerned. The continuation of this policy of hospital transfers will eventually terminate our Research Program as the care and treatment of veterans will become the responsibility of other authorities. In the interim periods prior to transfers it is a well recognized policy that the hospitals as a whole, including their Research programs, must be maintained at a high level of efficiency.

2.3 a) In practice heads of university departments whose fields of interest correspond with active research programs in D.V.A. hospitals recommend graduating students for positions in such D.V.A. programs. In many instances such students are entering the post-graduate school and will be working for Master's degrees or doctorates while assisting with the research projects. (e.g. McGill departments of Investigative Medicine, Psychiatry and Psychology, Sociology and Social Work; also University of Montreal department of Psychology; a total of 16 for 1967-68).

2.3 b) As in a), graduate students are under tutelage of members of appropriate university departments and are, therefore, encouraged or discouraged according to their capabilities.

2.3 c)
2.3 d) N.A.

2.3 e) Research funds are granted from time to time to obtain special scientific training or technical instruction in another centre in order to do such work in a planned project.

2.4 Distribution of Activities

a) The regional pattern of the Department's spending on scientific activities in the amount of approximately \$400,000 per year is spread across

Canada with about 75% being spent in Ontario and Quebec. This has decreased somewhat with the transfer of Sunnybrook Hospital, and the closing out of our Research Program in that area.

2.4 b) The regions best suited for our clinical Research Program are in Medical School centres where a close association between D.V.A. hospitals and University staff is encouraged.

2.4 c) N/A

2.4 d) and e)

Since Dr. Wm. Middleton's detailed investigation of 1954 the relationship of research activity in our hospitals to the local medical community has been followed and has continued to be either what he described as a "sustaining" or as an "augmenting" influence.

In Saint John, N.B., and Calgary, Alberta, the only research done in these centres has been in the D.V.A. hospitals. Antibiotic research in Saint John involved careful observations of effects of new Antibiotics results and were periodically reported to local Medical Society meetings and culminated in Dr. Branch being appointed to a WHO Export Committee. In Calgary, laboratory developments in biochemistry to support research in Atherosclerosis and later developments in the use of Radio-isotope tracers raised the tone of laboratory medicine in the community, as Dr. Duffin reported results at local medical meetings and gave demonstrations to visitors to his laboratories.

In University centres (Halifax, Quebec, Montreal, Toronto, London, Winnipeg and Vancouver) D.V.A. research has contributed in various specific fields as some area of work needed development in the eyes of the medical school and of the hospital authorities. In Halifax - Cardio-respiratory function (Dr. Gordon) and Peripheral vascular Surgery (Dr. Noble); in Quebec - Viral and Rickettsial disease (Dr. Paul Fiset); in Montreal, a number of examples but chiefly in the fields of chronic Pulmonary disease, Renal disease, Hepatic disease, Neurological disease from nutritional deficiencies (Hong Kong POW's), Parkinson's syndrome and a wide variety of Psychiatric and Psycho-social problems; in Toronto in the fields of Arthritis and Rheumatism, of Paraplegia, of chronic Hepatic disease; in Winnipeg in

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chronic Renal disease (Dr. Thomson) and certain Isotope usage; in London in Geriatric nutrition and in various Psychiatric problems; in Vancouver in disorders of Calcium metabolism with and without renal disease coupled with development of high grade steroid chemistry to support Endocrine studies - also Isotope tracer usage for similar purposes.

2.5 - a) Current professional personnel

<u>Medical Consultants</u>	-	15
<u>Investigators</u> - Medical, full time	-	8
Medical, part time		61
non-Medical, full time	-	4
non-Medical, part time		11

2.5 - b) - NIL

2.5 - c) Current year's personnel:

	<u>BACHELORS</u>	<u>MASTERS</u>	<u>DOCTORATE S</u>
Birth and Education) all Canadian)	4	3	57
Birth and Education) all U.S.A.)	0	1	1
Birth and Education) all U.K.)	0	0	8
Foreign born and Foreign) University)	1	0	6
Foreign born and Canadian) University)	1	0	4
Average number of working years since graduation =			17.1 years
Average number of years employed in DVA research =			7.5 years
Average age of personnel =			44.4 years
Percentage effectively bilingual =			25%
			(all east of Winnipeg)

2.5 - d)	<u>BACHELORS</u>	<u>MASTERS</u>	<u>DOCTORATES</u>
1962	7	4	50
1963	7	7	57
1964	7	8	67
1965	5	8	72
* 1966	7	4	62
1967	5	5	68
1968	5	6	80

* Note: Fall in numbers because of transfer of Sunnybrook Hospital, Toronto.

2.5 e) Because of the great preponderance of part time investigators who start and complete research projects at irregular intervals it is not possible to provide significant statistics in answer to this question relating to turn-over of staff.

The hospitals have had Research Fellowships on a one year appointment basis that totalled 10 to 11 from 1962 to 1967. Following the transfer of Sunnybrook Hospital the annual Fellowships have totalled 4 to 5.

2.5 f) In general almost 100% of those taking a major part in the research programs of the hospitals hold university appointments.

2.5 g) NIL

2.5 h) Each hospital has had considerable numbers of students employed every summer, but only a small proportion have worked on research projects. In the period 1962-1968 students on research have averaged 10 to 12 across the country each summer.

Owing to new Treasury Board rulings it is doubtful that any summer employment of university students can be continued as of 1969 in that they have been placed under the stringent manpower ceiling that limits total employment in each hospital.

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sect. 2.6 (a) & (b)

All expenditures shown fall into the following categories:

Function: Intramural ResearchScientific Discipline: Medical SciencesArea of Application: Health

<u>Categories</u>	<u>Total Expenditures</u>					
	1962-63	1963-64	1964-65	1965-66	1966-67	1968-69
	\$	\$	\$	\$	\$	\$
Function: Intramural R	390,737	398,002	408,312	405,759	417,765	417,000
Scientific Discipline: Medical Sciences	390,737	398,002	408,312	405,759	417,765	417,000
Area of Application: Health	390,737	398,002	408,312	405,759	417,765	417,000
<u>Units</u>						
Camp Hill Hospital, Halifax	21,759	14,916	14,967	12,480	14,017	12,000
Lancaster Hospital, Saint John	5,884	5,276	2,405	-	-	-
Ste. Foy Hospital, Quebec	8,923	4,913	6,229	6,953	6,423	-
Queen Mary Veterans Hospital, Montreal	96,743	102,376	128,740	107,564	113,893	147,000
Ste. Anne's Hospital, Ste. Anne de Bellevue, P.Q.	-	-	-	-	-	12,000
Sunnybrook Hospital, Toronto	102,009	99,793	95,111	99,005	94,678	9,000
Westminster Hospital, London	55,480	71,001	57,553	72,334	72,520	91,000
Deer Lodge Hospital, Winnipeg	56,710	54,865	50,996	53,195	57,610	68,000
Shaughnessy Hospital, Vancouver	39,965	43,943	47,349	47,313	45,773	71,000
Miscellaneous, Head Office	3,264	919	4,962	6,915	12,851	7,000
Totals	390,737	398,002	408,312	405,759	417,765	417,000

2.6 - b) (continued)

Operating & Capital Fund expenditures cannot be shown separately as the accounting systems have only been set up to show these categories for the current year.

Historically in our type of operation the proportions of moneys expended on major equipment fluctuate wildly from year to year. Waves correspond with major technological breakthroughs. Thus in the early 1950's research using Isotope tracers necessitated major equipping efforts for projects that subsequently operated on modest operating expenses. In the last 3 years new analytical methods such as Gas Chromatography and sophisticated electronic monitoring apparatus again engender an increase in major equipment. Advances in Electron Microscopy are now making it an essential tool for research in the cancer and metabolic (enzymology) fields. Particularly in Montreal and London (Ont.) existing Electron Microscopes in university departments and in other hospitals are now in full-time use and if our research work involves such work we have to stand on our own feet or discontinue a promising investigation. In the Westminster Hospital there is full justification for a smaller, medium power 'scope which, with accessories, calling for an outlay of \$40,000.00 in this hospital which has not spent more than \$5,000.00 a year in recent years. Ste. Anne's Hospital's expenditures for equipment in the last 10 years has been virtually nil but monitoring equipment for a Psychiatric-Psychological Unit capable of tackling the analysis of dream states justifies expenditures of \$20,000 to \$30,000.00. Such units cannot be built up bit by bit. In the current year, expenditures for major equipment are \$5,000.00 to \$10,000.00. Next year \$70,000.00 would be quite justified although specific proposals have not come forward as yet.

2.6 - c)

Nil

2.7 - Research Policies

a) - 1) 2)

The selection, the granting of priorities, monitoring procedures and relationships with other Federal agencies have been described in section 2:2.

a) 5) Extramural funding as such has not been part of our program but from time to time supplemental special facilities have been needed and could not justifiably be set up in our hospitals. By arrangement with university departments the work has been carried on there with appropriate reimbursement of the university for the costs.

a) 6) In that our program control consists of annual reassessments of projects, the requirement for major reassignments of funds in the course of a year is minimal. When such occurs the request is treated like a new project.

2.7 b) - N/A

2.8 - 1), 2), 3), 4) - Publications, etc., are submitted as Appendix C.

2.8 - 7) Although Research teams in strictly defined terms have not been developed nevertheless recognized concentrations of expertise have emerged. The three most noteworthy examples are:

(i) The Clinical Investigation Unit - Montreal, under Dr. C.J. Pattee, Dr. B.M. Murphy and Dr. E.J. Pinter, has established an international reputation in the field of Endocrinology.

(ii) The Psychiatric, Psycho-Social research team in Queen Mary Veterans and Ste. Anne's hospitals represents a relatively new concept for tackling problems on a broad basis by establishing general lines of approach and then breaking down the inquiries into specific investigations that become building-blocks for the greater structure. This type of approach with continuing guidance from senior experts in different academic disciplines has many highly original features.

(iii) The team guided by senior men from the University of Western Ontario, that continues to produce valuable work on disorders of the Gastric-Intestinal tract, makes the Clinical Investigation Unit of the Westminster Hospital an outstanding authoritative centre.

2.9 - 1) Projects: Lists of projects (1962 to 1968) are submitted as Appendix D.

2.9 - 2) Examples of the most significant projects:

- (1) Project 14 - 50 - Clinical Investigation Unit Queen Mary Veterans Hospital. The work of Dr. B.E.P. Murphy may be summarized in the following terms:

A number of hormones have been shown to be bound to plasma proteins and this binding appears to be of fundamental importance in their transport and availability to the tissues. The work over the past 3 years has been largely concerned with studying the various aspects of this phenomenon as it concerns thyroid and steroid hormones of man and various animals. The remarkable properties of these proteins have led to the development of very sensitive and specific methods for the determination of these hormones in the minute amounts found in blood and cerebrospinal fluid. Some of these methods have wide clinical application and are being used in a number of centres in Canada and the United States.

In 1964, the general principles of the application of the property of protein-binding to the assay of hormones were discussed in an article in Nature (1). The detailed description of the method for the determination of thyroxine was published (2) and was later modified for greater convenience (4). An extensive clinical study in 1500 patients was made to validate these methods biologically, and was published in 1966 (6).

Over the same period, parallel studies were made to develop methods for various steroids (5) and to evaluate these clinically (3).

Corticosteroid binding globulins in various diseases in man and in a number of animals have also been studied (11a).

The methods developed as described above have been used clinically at Queen Mary Veterans Hospital, to aid in the diagnosis of thyroid, pituitary and adrenocortical diseases. Some unusual cases are being published (11).

The development of microassays for corticoids (10) made it possible to study the levels of corticosteroids in spinal fluid under various conditions and the transfer of steroids between blood and spinal fluid (9a, 10a, 12).

Current studies deal with the binding of estrogens and androgens and their assay in blood (11a).

Several other articles have been written for books, on invitation (7,8,9).

PUBLISHED ARTICLES (since February, 1964)

- (1) MURPHY, B.E.P.: The application of the property of protein-binding to the assay of minute quantities of hormones and other substances. *Nature*, 201:679, February 15th, 1964.
- (2) MURPHY, B.E.P., and PATTEE, C.J.: The determination of thyroxine utilizing the property of protein-binding. *J. Clin. Endocr. & Metab.*, 24:187, 1964.
- (3) MURPHY, B.E.P., HOOD, A.B., and PATTEE, C.J.: Clinical studies utilizing a new method for the serial determination of plasma corticoids. *Can. Med. Ass. J.*, 90:775, 1964.
- (4) MURPHY, B.E.P., and PATTEE, C.J.: The determination of plasma corticoids by competitive protein-binding analysis using gel filtration. *J. Clin. Endocr. & Metab.*, 24:919, 1964.
- (5) MURPHY, B.E.P.: The determination of thyroxine by competitive protein-binding analysis employing an anion-exchange resin and radiothyroxine. *J. Lab. & Clin. Med.*, 66:161, 1965.
- (6) MURPHY, B.E.P., PATTEE, C.J., and GOLD, A.: Clinical evaluation of a new method for the determination of serum thyroxine. *J. Clin. Endocr. & Metab.*, 26:247, 1966.
- (7) MURPHY, B.E.P.: The determination of plasma corticoids and their clinical significance. A chapter from "An Introduction to Clinical Neuroendocrinology", ed. by E. Bajusz (S. Karger, Basel/New York 1967).
- (8) MURPHY, B.E.P.: The determination of cortisol in blood. A chapter from *Clinical Endocrinology II*, Astwood, E.B., and Cassidy, C.E., editors, Grune and Stratton. In Press.
- (9) MURPHY, B.E.P., and PATTEE, C.J.: The determination of thyroxine in blood. A chapter in *Clinical Endocrinology II*, Astwood, E.B., and Cassidy, C.E., editors, Grune and Stratton. In Press.
- (10) MURPHY, B.E.P.: Some studies of the protein-binding of steroids and their application to the routine micro and semimicro

measurement of various steroids in body fluids by competitive protein-binding analysis. J. Clin. Endocr. & Metab. In Press.

- (11) KLASSEN, J., and MURPHY, B.E.P.: Bilateral adrenal hemorrhage. Case report and review of the literature. Submitted to the New England Journal of Medicine, December, 1966.
- (12) MURPHY, B.E.P., COSGROVE, J.B., McILQUHAM, M.C., and PATTEE, C.J.: Adrenal corticoid levels in human cerebrospinal fluid. Submitted to the Canadian Medical Association Journal, February, 1967.
- (ii) Project 60-51. After preliminary work by Dr. Arnold Branch (Lancaster Hospital) and Dr. Hugh Starkey (Queen Mary Veterans Hospital) research was concentrated under Dr. Branch and is terminating this year (1968).

Because antibiotic sensitivity testing by hospital laboratories was uncontrolled it was demonstrated that confusion reigned everywhere and that those responsible for choosing the right drugs for treatment were being misled by laboratory reports. Standardization methods were developed and a control lab for all DVA hospitals was established.

Further work on standardization problems was pursued and control of testing products was established first by the Canadian Food and Drug Administration and later by the FDA of the United States.

In 1962 the World Health Organization set up an expert committee to consider international standardization and Dr. Branch was invited to join the committee as the only Canadian and one of three members from America.

Dr. Branch has continued to work on particular assignments from this WHO Committee (centred on the Karolinski Institute, Stockholm) and is now working on the final report to WHO.

- (iii) Project 31-51 - The work of Drs. Metcalfe, Hobbs and Lovegrove of Westminster Hospital on schizophrenic patients which has continued for a number of years, made a considerable stir in scientific circles when originally reported and interest has continued. These were exhaustive studies on the relationships of various metabolic parameters to schizophrenia in a large population of hospitalized veterans. Their premise has been that some metabolic disorder might exist as the basis for schizophrenia. Numerous publications have resulted.
- (iv) Project 36-51 - In Deer Lodge Hospital in Winnipeg, Dr. A.E. Thomson continues to direct the clinical investigation and has moved more into the field of Renal disease lately. Prior to this his unit studied other problems. This unit was the first in North America to apply in an extensive way the knowledge of adrenergic participation in the development and maintenance of the clinical shock picture. This work was a direct extension of numerous experimental studies conducted during this period in the Department of Pharmacology, University of Manitoba, then under the direction of Dr. M. Nickerson. These clinical studies led to a better understanding of the pathogenesis of human shock and the principles enunciated have generally been accepted as part of current management.

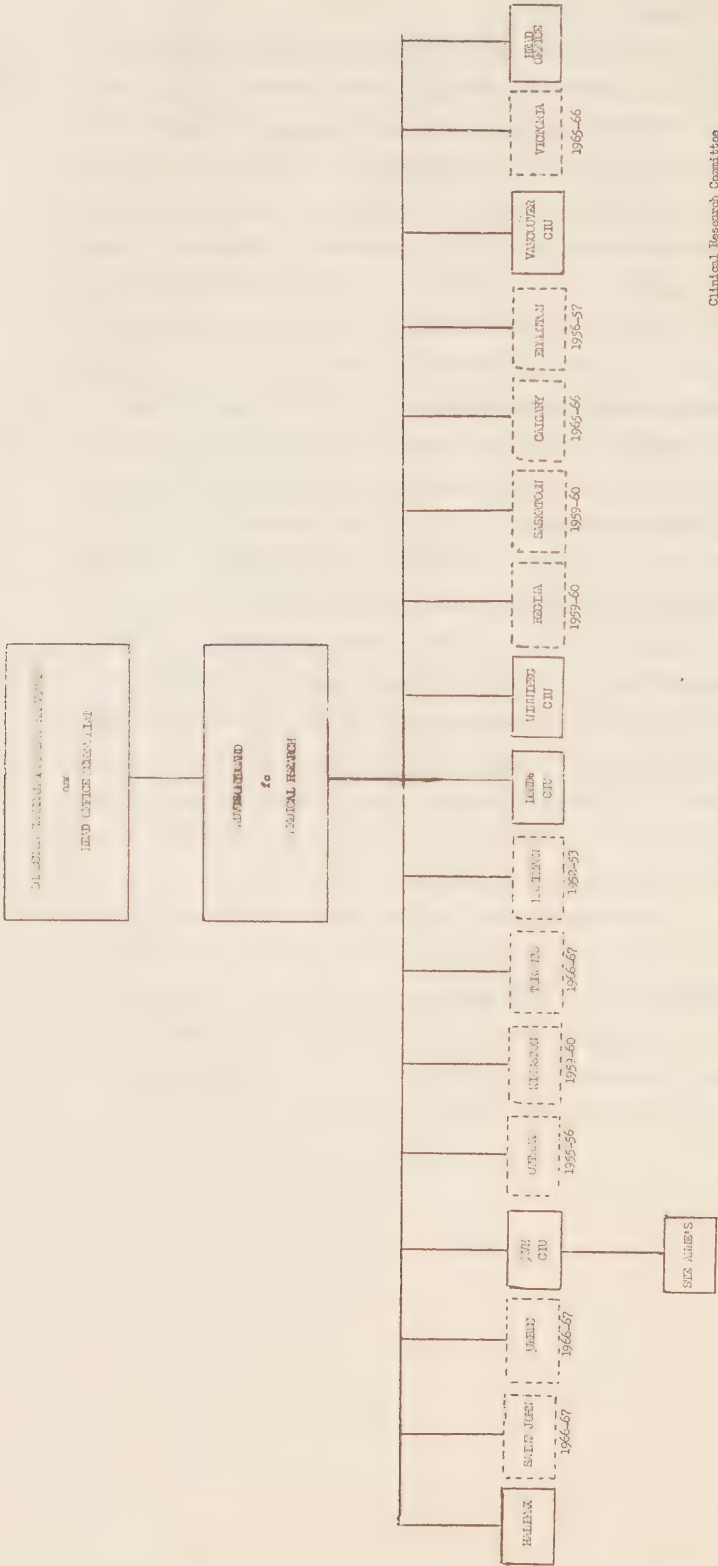
2.10 - Forecasts:

Advances in the care of the sick are continuous, as our understanding of the various disease processes increases. It is almost invariable that new knowledge stems from applying up to date scientific and technological methods to the elucidation of problems of disease. From time to time there is a technological break-through such as the use of radio-isotopes as tracers for following pathways of biological functions. The consequences of a break-through result in rather sudden needs for capital expenditures to provide heretofore non-existent scientific facilities. Mostly the technological advances are in the form of an orderly progress and represent a process of building up, refining or expanding existing, basic facilities such as laboratories for analytical chemistry, electronic devices for measuring physiological functions or refined electron microscopy. Advances may also be anticipated and watched in fields such as Immunology which involve several scientific disciplines (all types of chemistry, microbiology and anatomical Pathology).

It is the responsibility of authorities directing medical services, such as the Veterans hospitals, to watch all developments in the medical research field whether or not such developments are emerging from their own research programs or from other programs in this or other countries. It is constantly required of the directing authorities that they judge when a new development becomes of proven value and has to be transferred to the category of good patient care.

In summary it may be said that the intramural research in our hospitals should continue to be encouraged in fields that supplement rather than duplicate, what is being actively pursued in other centres. This implies that our major fields of interest should be in the more slowly developing diseases and in the problems of rehabilitation or long term care of medically static but helpless individuals.

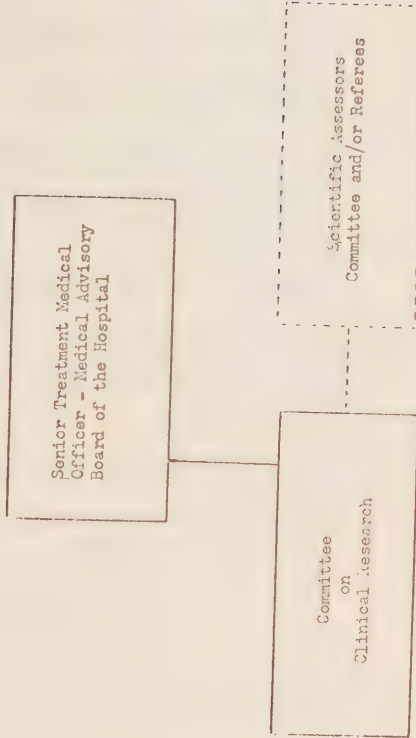
Appendix A



Clinical Research Committee
CIU - Clinical Investigation Unit
--- Projects terminated and year of termination

Appendix B

Organization at Units



APPENDIX "C"

RESEARCH OUTPUT
CAMP HILL HOSPITAL
HALIFAX, NOVA SCOTIA

2.8) 1) PATENTS:- Nil2) PUBLICATIONS:-

1. "High Fish Diet, Obesity and Blood Cholesterol".
C.M. Harlow, M.D., Ph.D., D.Sc., Camp Hill Hospital
- Nova Scotia Medical Bulletin - November, 1961.
2. "Diet, Cholesterol and Atherosclerosis".
C.M. Harlow, M.D., Ph.D., D.Sc.
- Canadian Hospital - July, 1960.
3. Use of Fish in the Control of Hypercholesteremia and Obesity - F.A.O. International Conference on Fish in Nutrition, Washington, D.C. - September 19-27, 1961.
Published in "Fish in Nutrition" Fishing Book Ltd., Ludgate House, 110 Fleet St., London, E.C.4, England.
4. Three papers in the process of being written for Canadian and American Medical Publications.

Dr. C. A. Gordon - Chronic Bronchitis

1. "A Report of the First Two Stages of the Co-ordinated Study of Chronic Bronchitis in the Department of Veterans Affairs, Canada".
- Medical Services Journal, Canada - Vol. XVIII, 1962, No. 4.
2. "A Report on the Third and Fourth Stages of the Co-ordinated Study of Chronic Bronchitis in the Department of Veterans Affairs, Canada".
- Medical Services Journal, Canada, Vol. XXII, No. 1, 5-59.
D. V. Bates, M.D.
C. A. Gordon, M.D.
G. I. Paul, Ph.D.
R.E.G. Place, M.D.
D. F. Snidal, M.D.
C. R. Woolf, M.D.
3. "Farmer's Lung".
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C. A. Gordon, M.D.
C. P. Handforth, M.D.
J.F.L. Woodbury, M.D.

3.) PAPERS PRESENTED AT MEETINGS AND LATER PUBLISHED IN PAMPHLET FORM:-

1. "Value of Fish in Health and Disease"
- International Food Editors Conference, Waldorf-Astoria Hotel, New York - October, 1960.
2. "Fish, Diets and Cholesterol"
- 19th Annual Meeting Fisheries Council of Canada, Charlottetown, P.E.I. - April 20, 1964.

3. "Nutritional Value of Fish in Coronary Heart Disease, Hypercholesteremia and Obesity".
- Canadian Dietetic Association 29th Annual Convention - June 18, 1964 - Halifax, N. S.
 4. "Effect of Simple Carbohydrates Versus Complex Carbohydrates on the Serum Cholesterol Level in a Group of Men on the Prudent Diet".
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 5. "Value of a High Fish Diet".
- U.S. National Fisheries Institute Meeting, Philadelphia, - April 26, 1963.
- 4) ARTICLES WRITTEN IN LAY MAGAZINES BY PROFESSIONAL LAY WRITERS:-
1. "The Great Nova Scotia Diet" -
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 2. "A New Health Diet From the Sea"
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Special Committee

RESEARCH OUTPUT
LANCASTER HOSPITAL
SANIT JOHN, NEW BRUNSWICK

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2. Reports to Drug and Disc manufacturers on new products.

4) REPORT TO MEETINGS OF:

1. International Interscience conferences on antimicrobial agents and chemotherapy.
2. The Canadian Public Health Association.
3. Canadian Association of Pathologists and Medical Bacteriologists.
4. W.H.O. Advisory Committee.

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Special Committee

RESEARCH CORPUSAPP. APPENDICESSSE. APP. DE BELLEVUE2.8) 1) PATENTS - Nil2) PUBLICATIONSby Dr. J.R.D. Payne

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WESTMINSTER HOSPITAL
LONDON, ONTARIO

2.8 (1). PATENTS - Nil

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Lewis, J.A., Nicholls, D.M., Troop, V.L. & Kim, O.S.

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Reprint from: The Canadian Medical Association Journal,
97, November 4, 1967, pp 1166 - 1167.

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Special Committee

RESEARCH OUTPUT
DEER LODGE HOSPITAL
WINNIPEG, MANITOBA

2.8) 1) PATENTS:- Nil

2) BOOKS OR JOURNAL ARTICLES ARISING FROM RESEARCH ACTIVITIES:

1. Thomson, A.E., Nickerson, M., Gaskell, P. and Grahame, G.R.: Clinical observations on an anti-hypertensive chlorothiazide analogue devoid of diuretic activity, Can. Med. Assn. J. 67:1306, 1962.
2. Davies, R.O., Cameron, W.H., Hollenberg, N.K., Thomson, A.E. and Nickerson, M.: Hemodynamic effects of phenoxybenzamine adrenergic blockade, Fed. Proc. 23:125, 1964.
3. Thomson, A.E.: Effect of ganglionic and adrenergic blocking agents on regional blood flow. In Shock and Hypotension, edited by L.C. Mills and J.H. Moyer, Grune and Stratton, New York, 1965, pp 182.
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and 4)

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UNIT PROJECTS 62-67

I. Hypertension and Hypotensive Agents:

1. Royal College Physicians and Surgeons, Toronto, January 1962.
2. IV World Congress of Cardiology, Mexico City, 1962.
3. College of General Practise, Winnipeg, 1963.

II. Pharmacology and Therapy of Shock:

1. International Congress of Internal Medicine, Munich, 1962.
2. American College of Chest Physicians, Chicago, 1965.
3. Ontario Medical Association, Toronto, 1965.
4. Hannermann Symposium on Shock and Hypotension, Philadelphia, 1965.
5. Canadian Medical Association, Winnipeg, 1965.
6. Canadian Federation of Biological Sciences, Montreal, 1967.

III. Renal Failure and Acid-Base Metabolism:

1. Royal College Physicians and Surgeons,
Saskatoon, 1966.
2. Canadian Society of Clinical Chemists,
Winnipeg, 1966.
3. Canadian Nephrology Society, Toronto, 1968.

IV. Symposium on Regulation of Salt Excretion,
Winnipeg, 1966.

Special Committee

RESEARCH OUTPUTSHAUGHNESSY HOSPITALVANCOUVER, B.C.2.8) 1) PATENTS - Nil2) PUBLICATIONS1963

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- Drance, S.M., Berry, V. and Hughes, A.: Studies on the Effects of Age on the Central and Peripheral Isopters of the Visual Field in Normal Subjects. *Amer. J. Opth.* 63:1667, 1967.
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- PUBLICATIONS: - Clinical Investigation Unit, Shaughnessy Hospital, Vancouver, B.C.
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- Copp, D.H. and McIntosh, H.W. Excretion of Calcium by the Kidney. *Rein et foie, Maladies de la Nutrition*, Vol. 4, June 1962. Symposium International sur la Lithiase Calcique, Vittel.
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- McIntosh, H.W. and Seraglia, M. The Effect of Acetazolamide and Triple Sulfonamide on Citrate and Calcium Excretion. *Canad. M.A.J.* 89: No. 26, 1332, Dec. 28, 1963.

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- McIntosh, H.W. Circadian Variation in Serum Calcium Levels.
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- Carruthers, B.M. Leukocyte Motility. I. Method of Study,
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Can. J. Physiol. & Pharmacol. 44: 475, May 1966.
- Carruthers, B.M. Leukocyte Motility. II. Effect of Absence of
Glucose in Medium; Effect of Presence of
Deoxyglucose, Dinitrophenol, Puromycin,
Actinomycin D, and Trypsin on the Response
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Can. J. Physiol. & Pharmacol. 45: 269, Mar. 1967.
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Clin. Research, 153, Jan. 1968.
- Walsh, G.C.,
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Olson, M. Determination of Total Body Water by Deuterium
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REPORTS TO CONFERENCES AND SCIENTIFIC MEETINGS:

In each year special aspects of the investigations listed as publications were also the subject of communications at meetings of a wide variety of Canadian and U.S. medical and scientific societies.

APPENDIX "D"

DEPARTMENT OF VETERANS AFFAIRS

NOT FOR PUBLICATION

Director, Department, Institution					Financial History
List Project Title	No.	Project No.	Year of Initiation	Categories A, B and C	
101 PATEE, C.J., C.I.U., Queen Mary Veterans Hospital, Montreal. Operation of Clinical Investigation Unit. 14-50 1950 10 19 18					\$ 492,125-50/65 36,604-65/66 32,113-66/67
102 PATERSON, J.C., C.I.U., Westminster Hosp., London. Operation of Clinical Investigation Unit. 17-50 1950 10 19 18					444,751-50/65 44,876-65/66 37,953-66/67
103 PATERSON, J.C., CARROLL, S.E., Laboratory, Westminster Hosp., London. Studies on Phlebothrombosis and Pulmonary Embolism 20-50 1950 17 27/38 7					24,032-50/65 2,050-65/66 Nil-66/67
104 OGYZLO, M., C.I.U., Sunnybrook Hosp., Toronto. Operation of Clinical Investigation Unit. 21-50 1950 10 19 18					489,070-50/65 29,619-65/66 32,144-66/67
105 PLACE, R.E.G., Cardio-Respiratory Function Laboratory, Queen Mary Veterans Hosp., Montreal. Continuation of Investigation of Aetiological Factors and Physiological Status in Cases of Chronic Bronchitis and Bronchiectasis. 27-50 1950 10 19 8					107,014-50/65 8,470-65/66 8,560-66/67
106 McINTOSH, H.W., C.I.U., Shaughnessy Hosp., Vancouver. Operation of Clinical Investigation Unit. 29-50 1950 10 19 18					448,862-50/65 33,858-65/66 Nil-66/67
107 METCALFE, E.V., HOBES, G.E., STEVENSON, J.A.F., LOVEGROVE, T.D. Psychiatry, Westminster Hosp., London. A Longitudinal Study of Schizophrenia, correlating biochemical and physiological measurements with psychiatric assessment. (The value of these measurements in the diagnosis and prognosis of this disease) 31-51 1951 39 32 5					92,647-51/65 9,628-65/66 10,008-66/67
108 THOMSON, A.E., C.I.U., Deer Lodge Hosp., Winnipeg. Operation of Clinical Investigation Unit. 36-51 1951 10 19 18					296,628-51/65 38,602-65/66 43,963-66/67
109 LEWIS, J.A., Medicine, Westminster Hosp., London. The Continued Study of Hypertension - (a) Clinical Trials of New Drugs. (b) The Studies of Renal and General Hemodynamic Effects of Lowering the Blood Pressure. 49-51 1951 10 28 7					864-54-65 Nil-65/66 Nil-66/67
110 THOMSON, A.E., CARTER, S., RUEDY, J., DAVIES, R.O. Deer Lodge Hosp., Winnipeg. Hypertension: Changes in Hemodynamics and Vascular smooth Muscle Tone produced by the Benzothiadiazines. 58-51 1951 10 6/30 7					25,060-51/65 Nil-65/66 Nil-66/67
111 BRANCH, A., Laboratory, Lancaster Hosp., Saint John. Survey of Antibiotic Laboratory Tests for Sensitivity and Resistance of Pathogenic Bacteria. 60-51 1951 17 5 19					69,235-51/65 Nil-65/66 Nil-66/67
112 PATERSON, J.C., Laboratory, Westminster Hosp., London. Blood Lipids and Atherosclerosis in Schizophrenics. 14-52 1952 17 6/27 7					78,242-52/65 Nil-65/66 Nil-66/67
113 GORDON, C.A., Cardio-Respiratory Function Laboratory, Camp Hill Hospital, Halifax. Co-ordinated Study of Chronic Bronchitis. 30-52(b) 1952 10 30 8					98,350-52/65 9,530-65/66 9,260-66/67

NOT FOR PUBLICATION

DEPARTMENT OF VETERANS AFFAIRS

Director, Department, Institution							Financial History
List No.	Project Title	Project No., Year of Initiation, Categories A, B and C					
114	PATERSON, J.C., Laboratory, Westminster Hosp., London. Factors in the Production of Coronary Artery Disease.	35-52	1952	17	27	7	\$ 46,404-53/65 4,718-65/66 4,948-66/67
115	MACDONALD, Ian, Medicine, Sunnybrook Hosp., Toronto. The Clinical and Biochemical Study of Certain Aspects of Atherosclerosis.	41-52	1952	20	19/6	7	135,716-52/65 15,140-65/66 10,250-66/67
116	PATTEE, C.J., HOOD, A.B. MURPHY, B.E., Laboratory, Queen Mary Veterans Hospital, Montreal. Study of Obesity.	10-54	1954	10	11/28	3	500-54/55 Nil
117	COULTER, W.K., Laboratory, Westminster Hosp., London. The Metabolism of Amino Acids in Normal and Diseased States.	10-55	1955	17	6/30	18	8,092-55/65 Nil
118	DANCEY, T.E., LUNDELL, F.W., MACPHERSON, A.S., Psychiatry, Queen Mary Veterans Hosp., Montreal. Critical Assessment of Background Material of Schizophrenic Veterans.	16-56	1956	39	32	5	Nil
119	KAYE, M., Medicine, Queen Mary Veterans Hosp., Montreal. A Systematic Study of Various Aspects of Renal Physiology and Disease.	26-56	1956	20	30	10	70,390-56/65 10,030-65/66 5,000-66/67
120	DANCEY, T.E., LUNDELL, F.W., MACPHERSON, A.S., Psychiatry, Queen Mary Veterans Hosp., Montreal. The Ataractic Drugs.	33-56	1956	39	28	5	Nil
121	DeJONG, D., BURNS, B.D., Neurology, Queen Mary Veterans Hosp., Montreal. An Investigation of Parkinson's Syndrome.	14-57	1957	22	38	6	80,043-57/65 6,650-65/66 7,450-66/67
122	DANCEY, T.E., LUNDELL, F.W., MACPHERSON, A.S., Psychiatry, Queen Mary Veterans Hospital, Montreal. A Study of the Psychodynamic and Social Aspects of the Compensation problem.	25-57	1957	39	32	18	3,600-60/61 Nil
123	COPLAND, G., Cardio-Respiratory Function Laboratory, Sunnybrook Hosp., Toronto. Coordinated Study on Chronic Bronchitis.	27-57	1957	10	30	8	58,182-57/65 6,792-65/66 5,395-66/67
124	COPP, D.H., McINTOSH, H.W., Laboratory, Shaughnessy Hosp., Vancouver Studies of Metabolic Bone Disease and Disorders of Calcium Metabolism.	15-58	1958	17	30	13	13,210-61/65 Nil
125	McINTOSH, H.W., Laboratory, Shaughnessy Hosp., Vancouver. Metabolic Studies on patients with Renal Calculi.	17-58	1958	17	30	18	2,000-60/61 Nil
126	SNIDAL, D.P., Cardio-Respiratory Function Laboratory, Deer Lodge Hosp., Winnipeg. Co-ordinated Study on Chronic Bronchitis.	26-58	1958	10	30	8	63,352-58/65 14,618-65/66 13,800-66/67
127	DAVIES, R.O., Surgery, Deer Lodge Hosp., Winnipeg. A Study in the Alterations in Maximum Muscle Blood Flow produced by Drugs.	4-59	1959	46	28	18	1,000-59/65 Nil

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List	Project Title	No. Project No., Year of Initiation, Categories A, B and C				
128	ARONOFF, A., GORESKY, C.A., HALPENNY, G.W., Medicine, Queen Mary Veterans Hosp., Montreal Studies in the Pathogenesis, Diagnosis and Treatment of various forms of Liver Disease. 9-59 1959 20 11/28 3					\$ 16,602-59/65 5,750-65/66 9,450-66/67
129	BATES, David, Cardio-Respiratory Function Laboratory, Royal Victoria Hosp., Montreal. Co-ordinated Study on Chronic Bronchitis. 18-59 1959 10 30 8					31,150-59/65 5,050-65/66 4,600-66/67
130	HARRIS, W.R., Surgery, Sunnybrook Hosp., Toronto. Follow-up Studies on Amputations and Prostheses. 5-60 1960 46 29 13					11,308-60/65 5,085-65/66 4,800-66/67
131	THOMSON, A.E., RUEDY, J., Laboratory, Deer Lodge Hosp., Winnipeg. In Vivo Dialysis in the Management of Subjects with Renal Failure. 9-61 1961 10 17 10					8,120-61/63 Nil
132	DANCEY, T.E., LUNDELL, F.W., MacPHERSON, A.S., Psychiatry, Queen Mary Veterans and Ste. Anne's Hosp., Montreal. Psychiatric Research Program. 10-61 1961 39 32 5					56,173-61/65 14,750-65/66 15,000-66/67
133	DANCEY, T.E., LUNDELL, F.W. CZANK, J., Psychiatry, Queen Mary Veterans Hosp., Montreal. A Study of Critical Flicker Fusion Frequency in Different Groups of Schizophrenic Patients. 12-61 1961 39 32 5					Nil
134	MITCHELL, J.C., Medicine, Shaughnessy Hosp., Vancouver. The Distribution Patterns of Psoriasis - Observations on the Koebner Response. 20-61 1961 20 10 12					8,400-61/65 Nil-65/66 213-66/67
135	DOWER, Gordon E., Medicine, Shaughnessy Hosp., Vancouver. Clinical Trial of the Polarcardiograph (PCG) 28-61 1961 20 8 7					710-62/65 Nil-65/66 1,000-66/67
136	MacKENZIE, Ian, Surgery, Camp Hill Hospital, Halifax. Investigation of (a) Encephalopathic substance and (b) Anti-Viral substance in Human Splenic extract. 4-62 1962 46 39 19					Nil
137	PATTEE, C.J., MURPHY, B.E., Laboratory, Queen Mary Veterans Hosp., Montreal. Protein-binding of Cortisol in various conditions. 9-62 1962 10 6/30 18					Nil
138	GAULT, H.M., Laboratory, Queen Mary Veterans Hosp., Montreal. Plasma P.S.P. Index of Renal Function. 11-62 1962 17 6 19					11,299-62/65 5,296-65/66 5,750-66/67
139	SMYTHE, Hugh A., Medicine, Sunnybrook Hosp., Toronto. A Study of the Influence of Diseases, Diets, and Drugs on the Metabolism of Uric Acid. 13-62 1962 20 6/30 3					4,894-62/65 4,880-65/66 4,595-66/67
140	McINTOSH, H.W., DARRACH, M., Laboratory, Shaughnessy Hosp., Vancouver. Release of Calcium Chelating Agents by Kidney Enzymes. 14-62 1962 17 6 10					Nil-62/65 Nil-65/66 31,775-66/67
141	MORTON, H.S., Surgery, Queen Mary Veterans Hosp., Montreal. Establishment of Basic Facilities for Research in Surgery. 16-62 1962 46 8 18					2,810-64/65 6,760-65/66 4,532-66/67

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List No.	Project Title	Financial History				
No.	Project No., Year of Initiation, Categories A, B and C					
142	HARLOW, G.M., Laboratory, Camp Hill Hosp., Halifax, N.S. The Long Term Effect of Regular Exercise on Balanced Diets in which Fish is one of the Main Sources of Protein and Unsaturated Fatty Acids on Males with - (1) Obesity, (2) Ischemic Heart Disease, (3) Familial Hypercholesteremia. 18-62 1962 24 6 19	\$	7,960-62/65	Nil		
143	MACLEAN, J.T., MORTON, H.S., Queen Mary Veterans Hosp., Montreal. The Study of Prostatic Carcinoma 19-62 1962 46 30/38 10		3,405-62/65 Nil-65/66 5,550-66/67			
144	AINSLIE, E., Medicine, Sunnybrook Hosp., Toronto. The Effect of the Kind of Fat in the Diet on Morbidity and Mortality in an Aging Male Population. 26-62 1962 20 6/15 18		25,412-62/65 18,430-65/66 10,940-66/67			
145	BAYNE, J.R.D., Physical Medicine, Ste. Anne's Hosp., Ste. Anne de Bellevue, P.Q. A project to test the response of War Veterans with a long term Ethanol Addiction to Psycho-Social Therapy in a Domiciliary Care Setting. 28-62 1962 36 33/37 5		3,885-62/65 3,480-65/66 3,480-66/67			
146	DANCEY, T.E., KRAL, A.V., WIGDOR, B., MACPHERSON, A.S., Psychiatry, Queen Mary Veterans Hosp., Montreal. A Study of the Psychodynamic, Social and Medical Problems of the Hong-Kong Prisoners-of-War. (Psychiatric Study). 5-63 1963 39 32/37 18		Nil			
147	THOMSON, A.E., CAMERON, W., DAVIES, R.O., Laboratory, Deer Lodge Hosp., Winnipeg, Man. The effect of Adrenergic Blockade on the Vascular Dynamics of Clinical Shock. 6-63 1963 10 19 18		Nil			
148	PRATT-JOHNSON, John A., Ophthalmology, Shaughnessy Hosp., Vancouver. The Influence of Systemic Vascular Hypertension and Arteriosclerosis on the progress of Visual Field Changes in Open Angle Glaucoma. 10-63 1963 26 32 7		1,999-63/65 2,133-65/66 5,825-66/67			
149	BONDY, D.C., Medicine, Westminster Hosp., London. Research on Post Gastrectomy Problems and on Intestinal Absorption. 1-64 1964 20 6 9		Nil-64/65 2,559-65/66 Nil-66/67			
150	PATERSON, J.C., CARROLL, S.E., Laboratory, Westminster Hosp., London. A Combined Radiological and Pathological Study of Occlusive Lesions of the Carotid-vertebral Artery System. 2-64 1964 19 27/35 7		Nil			
151	DUNCAN, I.B.R., Laboratory, Westminster Hosp., London, Ont. Study of the Epidemiology and Biological Properties of Atypical Group III Staphylococci. 3-64 1964 19 6/13 19		2,098-64/65 2,261-65/66 Nil-66/67			
152	DRANCE, S.M., PRATT-JOHNSON, J.A., Ophthalmology, Shaughnessy Hosp., Vancouver. Study of the Influence of intraocular pressure on retinal sensitivity and electroretinogram. 7-64 1964 26 23 19		4,673-64/65 2,234-65/66 Nil-66/67			
153	LEVY, S.W., Laboratory, Queen Mary Veterans Hosp., Montreal. Lysosomal Enzymes in Inflammation and Disease. 12-64 1964 17 6 18		3,951-64/65 7,447-65/66 4,985-66/67			

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List No.	Project Title	Project No., Year of Initiation, Categories A, B and C				
154	ERDOGAN, M., Orthopaedics, Camp Hill Hospital, Halifax, N.S. A Study of the Prolapsed Intervertebral Disc Syndrome with follow-up of cases treated (a) by operation, and (b) conservatively. 13-64	1964	46	38	13	\$ 2,592-64/65 3,280-65/66 3,280-66/67
155	OGRYZLO, M.A., SMYTHE, H.A., Medicine, Sunnybrook Hosp., Toronto. Reduction of Hyperuricemia with Pyrazolopyrimidine (HPP) and Sulfinpyrazone in patients with Gout and other Diseases. 18-64	1964	19	32/20	7	4,208-64/65 Nil
156	LAWSON, G.A., GODFREY, C.M., Physical Medicine, Sunnybrook Hosp., Toronto. Study of Pressure on the Skin of Weight Bearing Areas of Human Beings under Normal and Abnormal Conditions. 19-64	1964	36	29	18	Nil-64/65 Nil-65/66 4,942-66/67
157	WALSH, G.C., CARRUTHERS, B.M., SERAGLIA, M., Medicine, Shaughnessy Hosp., Vancouver, B.C. Study of Body Composition in Patients with Congestive Heart failure Before and After the Use of Diuretics. 22-64	1964	20	6	7	Nil
158	JOHNSON, G.E., Nursing, Head Office, Ottawa. Quality and Quantity of Nursing Care Required in D.V.A. Hospitals. 25-64	1964	23	20	19	3,500-64/65 6,500-65/66 5,000-66/67
159	MITCHELL, J.C., Medicine, Shaughnessy Hosp., Vancouver, B.C. Investigation of Allergy to Lichens. 1-65	1965	20	10	1	7,370-65/66 5,800-66/67
160	HOLUBITSKY, I.B., BOGOCH, A., Surgery, Shaughnessy Hosp., Vancouver. Clinical and Experimental Studies of Stomal (Recurrent) Peptic Ulceration. 2-65	1965	46	19/13	9	4,968-65/66 4,050-66/67
161	GAGNON, P.M., Laboratory, Ste. Foy Hosp., Quebec, P.Q. Etude immuno-électrophorétique de l'urine humaine normale et pathologique. 3-65	1965	31	18	10	4,644-65/66 7,030-66/67
162	HODGES, W.E., Audiology, Sunnybrook Hosp., Toronto, Ont. Correlation of Conversational Voice to Assessment by Audiometric Procedures. 5-65	1965	45	24	6	5,000-65/66 5,000-66/67
163	WATT, D.L., Cardiology, Sunnybrook Hosp., Toronto. Development of a Machine for the Provision of External Cardiac Massage. 6-65	1965	20	8	7	1,500-65/66 1,500-66/67
164	SENN, J., MALKIN, D., MALKIN, A., HARRISON, A.W., Laboratory, Sunnybrook Hosp., Toronto, Ont. Hematologic and Nutritional Sequelae of Gastric Surgery for Duodenal Ulcer. 7-65	1965	9	6	9	5,720-65/66 11,960-66/67
165	LEWIS, J.A., SULLIVAN, H.F., Medicine, Westminster Hosp., London, Ont. Research in Education in the Pharmaceutical Sciences for hospital pharmacists. 10-65	1965	20	20/28	19	5,501-65/66 5,554-66/67
166	BAYNE, J.R.D., Physical Medicine, Ste. Anne's Hosp., Ste. Anne de Bellevue, P.Q. Changes in the Attitudes of Staff in the Face of Increasing Freedom of Choice and Action of Patients in a Long-Term General and Psychiatric Hospital. 11-65	1965	20	37	5	3,350-65/66 5,200-66/67

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List No.	Project Title	Project No., Year of Initiation, Categories A, B and C				
167	AUBERT, E., Laboratory, Ste. Anne's Hosp., Ste. Anne de Bellevue, P.Q. Classification and assessment of virulence of "atypical" Myco- bacteria of human origin. 12-65 1965	4	5	1	250-65/66 250-66/67	
168	PATTEE, C.J., MURPHY, B.E.P., Medicine, Queen Mary Veterans Hosp., Montreal, P.Q. A Study of Corticoids in cerebrospinal fluid. 13-65 1965	10	12	21 1/2	Nil	
169	KINSELLA, T.D., Medicine, Queen Mary Veterans Hosp., Montreal, P.Q. Rheumatoid (ankylosing) spondylitis: long-term follow-up. 14-65 1965	20	19	13	Nil	
170	PARFITT, G.J., Dentistry, Shaughnessy Hosp., Vancouver, B.C. Physical Measurement of Tooth Supporting Structures in Individuals with Known Systemic Disease. 21-65 1965	11	9	9	Nil	
171	CARROLL, S.E., Surgery, Westminster Hospital, London, Ont. Studies in Peripheral Vascular Disease. 22-65 1965	46	38	7	Nil	
172	CARROLL, S.E., Surgery, Westminster Hosp., London, Ont. Cardio-pulmonary studies. 23-65 1965	46	19	7	Nil	
173	CARROLL, S.E., Surgery, Westminster Hosp., London, Ont. Further investigation of problems in small vessel anastomoses. 24-65 1965	46	38	7	Nil	
174	MacDONALD, W.G., Medicine, Shaughnessy Hosp., Vancouver, B.C. Studies of Gastric Cancer Among the Japanese of B.C., 25-65 1965	20	19	9	Nil	
175	STEWART, W.D., Medicine, Shaughnessy Hosp., Vancouver, B.C. A Comparative Study of Topically applied adrenocorticosteroids and their effect on the oxygen utilization of normal skin. 26-65 1965	20	10	12	Nil	
176	HAINES, D.S.M., C.I.U., Westminster Hosp., London, Ont. Studies in Lipid Metabolism. 27-65 1965	5	6	40	1,300-65/66 Nil-66/67	
177	DOIG, D.N.W., Psychology, Camp Hill Hosp., Halifax, N.S. Personality Disorders, Autonomic Response Specificity, and Tachistoscopic Identification. 1-66 1966	38	32	5	2,400-66/67	
178	McINTOSH, H.W., BALFOUR, J., COPP, D.H., DARRACH, M., FISHMAN, S., McPHERSON, G.D., SUTHERLAND, W.H., C.I.U., Shaughnessy Hosp., Vancouver, B.C. Studies of Calcium Homeostasis in Metabolic Bone Disease and Renal Lithiasis. 2-66 1966	10	30	10	Nil	
179	MITCHELL, J.C., Dermatology, Shaughnessy Hosp., Vancouver, B.C. Comparative Studies by Cell Culture Methods of Fibroblasts Derived from Normal Individuals and Psoriatics. 3-66 1966	20	10	12	Nil	
180	STORDY, S.N., Medicine, Shaughnessy Hosp., Vancouver, B.C. Small Bowel Biopsies and Fat Balance Studies in Diabetic Patients. 4-66 1966	20	19	3	Nil	

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List No.	Project Title	Project No., Year of Initiation, Categories A, B and C				
181.	FAHRMI, B.M., A. & R. Unit, Shaughnessy Hosp., Vancouver, B.C. Assessment of Out-of-work Veterans and Comparable non-veteran group. 5-66	1966	48	40	19	\$ Nil
182	MUSAPH, F.W., Dentistry, Shaughnessy Hosp., Vancouver, B.C. Cineradiographic study of the temporo-mandibular joints in relation with the occlusion of natural and artificial dentition. 6-66	1966	11	40	19	Nil
183	LITHERLAND, H.K., Surgery, Shaughnessy Hosp., Vancouver, B.C. Peripheral Arterial Occlusive Disease Study. 7-66	1966	46	27	7	130-66/67
184	MARGETTS, E.L., HUTTON, G.H., GORESKY, V.W., Psychiatry, Shaughnessy Hosp., Vancouver, B.C. Assessment of Metronidazole in Treatment of Alcoholism. 8-66	1966	39	28	3	Nil
185	MITCHELL, J.C., BUCK, H.W.L., Dermatology, Shaughnessy Hosp., Vancouver, B.C. Photosensitivity. Investigation of Patients by Photo Patch testing. Case Finding (Erythropoietic Protoporphyria). 9-66	1966	20	10	19	Nil
186	SHEPHERD, W.E., SUTHERLAND, W.H., Laboratory, Shaughnessy Hosp., Vancouver, B.C. Studies of Air Conditioning, Air Filtration and Air Recirculation for Surgical Suites. 10-66	1966	17	36	19	Nil
187	PLAGE, R.E.G., ARONOVITCH, M., KAHANA, L.M., Laboratory, Queen Mary Veterans Hosp., Montreal, P.Q. The role of the alveolar surface film in the pathogenesis of emphysema and other chronic respiratory conditions. 11-66	1966	10	27	8	1,800-66/67
188	FORD, R.M., Neurosurgery, Queen Mary Veterans Hosp., Montreal, P.Q. An Evaluation of Ultrasonic Tomography in the Investigation of Neurological and Neurosurgical Patients. 12-66	1966	22	21	6	2,440-66/67
189	MACDONALD, R.I., Medicine, Sunnybrook Hosp., Toronto, Ont. A Study of the Effects of Certain Drugs on Platelet Adhesiveness, Platelet Economy and the Coagulation Mechanism, and Their Relation to Morbidity and Mortality. 13-66	1966	20	17	19	21,480-66/67

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List No.	Project Title	Project No., Year of Initiation, Categories A, B and C				
101	PATTEE, C.J., C.I.U., Queen Mary Veterans Hospital, Montreal. Operation of Clinical Investigation Unit. 14-50 1950 10 19 18					\$ 433,744-50/64 58,391-64/65 32,260-65/66
102	PATERSON, J.C., C.I.U., Westminster Hosp., London. Operation of Clinical Investigation Unit. 17-50 1950 10 19 18					404,363-50/64 40,388-64/65 36,788-65/66
103	PATERSON, J.C., Laboratory, Westminster Hosp., London. Studies on Phlebothrombosis and Pulmonary Embolism 20-50 1950 17 27/38 7					21,996-50/54 2,036-64/65 Nil-65/66
104	OGRYZLO, M., C.I.U., Sunnybrook Hosp., Toronto. Operation of Clinical Investigation Unit. 21-50 1950 10 19 18					457,340-50/64 31,730-64/65 31,990-65/66
105	PLACE, R.E.G., Cardio-Respiratory Function Laboratory, Queen Mary Veterans Hosp., Montreal Continuation of Investigation of Aetiological Factors and Physiological Status in cases of Chronic Bronchitis and Bronchiectasis. 27-50 1950 10 19 8					98,352-50/64 8,662-64/65 8,200-65/66
106	McINTOSH, H.W., C.I.U., Shaughnessy Hospital, Vancouver. Operation of Clinical Investigation Unit. 29-50 1950 10 19 18					418,346-50/64 30,516-64/65 29,720-65/66
107	METCALFE, E.V., HOBBS, G.E., STEVENSON, J.A.F., LOVEGROVE, T.D. Psychiatry, Westminster Hosp., London. A Longitudinal Study of Schizophrenia, correlating biochemical and physiological measurements with psychiatric assessment. (The value of these measurements in the diagnosis and prognosis of this disease) 31-51 1951 39 32 5					82,647-51/64 9,546-64/65 9,638-65/66
108	THOMSON, A.E., C.I.U., Deer Lodge Hosp., Winnipeg. Operation of Clinical Investigation Unit. 36-51 1951 10 18					256,088-51/64 40,540-64/65 40,000-65/66
109	GILPIN, R.E., Prosthetics, Sunnybrook Hosp., Toronto. Investigation of Materials and Design of Joints and Assemblies in Artificial Limbs and Orthopaedic Appliances. 48-51 1951 36 29 13					5,884-51/64 52-64/65 500-65/66
110	LEWIS, J.A. KAVELMAN, D.A., Medicine, Westminster Hosp., London. The Continued Study of Hypertension - (a) Clinical Trials of New Drugs. (b) The Studies of Renal and General Hemodynamic Effects of Lowering the Blood Pressure. 49-51 1951 10 28 7					864-54/64 Nil-64/65 Nil-65/66
111	THOMSON, A.E., C.I.U., Deer Lodge Hosp., Winnipeg. Hypertension: Changes in Hemodynamics and Vascular smooth Muscle Tone produced by the Benzothiadiazines. 58-51 1951 10 6/30 7					25,060-51/64 Nil-64/65 Nil-65/66
112	BRANCH, A., Laboratory, Lancaster Hosp., Saint John. Survey of Antibiotic Laboratory Tests for Sensitivity and Resistance of Pathogenic Bacteria. 60-51 1951 17 5 19					66,830-51/64 2,405-64/65 Nil-65/66
113	PATERSON, J.C., Laboratory, Westminster Hosp., London. Blood Lipids and Atherosclerosis in Schizophrenics. 14-52 1952 17 6/27 7					78,242-52/64 Nil-64/65 Nil-65/66

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List Project Title	No.	Project No.	Year of Initiation	Categories A, B and C		
114 A GORDON, C.A., Cardio-Respiratory Function Laboratory, Camp Hill Hosp., Halifax. Co-ordinated Study of Chronic Bronchitis. 30-52(b) 1952 10 30 8						\$ 89,090-52/64 9,260-64/65 9,260-65/66
114 B PATERSON, J.C., Laboratory, Westminster Hosp., London. Factors in the Production of Coronary Artery Disease. 35-52 1952 17 27 7						42,079-53/64 4,325-64/65 4,438-65/66
115 MACDONALD, Ian, Medicine, Sunnybrook Hosp., Toronto. The Clinical and Biochemical Study of Certain Aspects of Atherosclerosis. 41-52 1952 20 19/6 7						124,774-52/64 10,942-64/65 15,123-65/66
116 PATTEE, C.J., HOOD, A.B. MURPHY, B.E., Laboratory, Queen Mary Veterans Hosp., Montreal Study of Obesity. 10-54 1954 10 11/28 3						500-54/55 Nil
117 NICHOLLS, Doris, BOCKING, D., ROSSITER, R.J., STEVENSON, J.A.F. Laboratory, Westminster Hosp., London. The Metabolism of Amino Acids in Normal and Diseased States. 10-55 1955 17 6/30 18						6,522-55/64 1,570-64/65 Nil-65/66
118 OGRYZLO, M.A., DAUPHINEE, J.A., FLETCHER, A.A., Medicine, Sunnybrook Hosp., Toronto. Plasma Protein Studies: (paper electrophoresis and starch gel electrophoresis). 25-55 1955 20 6 18						18,690-55/64 1,800-64/65 Nil-65/66
119 DANCEY, T.E., LUNDELL, F.W., MESZAROS, A.F., Psychiatry, Queen Mary Veterans Hosp., Montreal. Critical Assessment of Background Material of Schizophrenic Veterans. 16-56 1956 39 32 5						Nil
120 KAYE, M., HALPENNY, G.W., Medicine, Queen Mary Veterans Hosp., Montreal. A systematic Study of Various Aspects of Renal Physiology and Disease. 26-56 1956 20 30 10						61,120-56/64 9,270-64/65 9,120-65/66
121 DANCEY, T.E., LUNDELL, F.W., Psychiatry, Queen Mary Veterans Hosp., Montreal. The Ataractic Drugs. 33-56 1956 39 28 5						Nil
122 DeJONG, D., BURNS, B.D., KRAL, A., WIGDOR, B., SOLIS-QUIROGA, O.H. Neurology, Queen Mary Veterans Hosp., Montreal. An Investigation of Parkinson's Syndrome. 14-57 1957 22 38 6						63,016-57/64 17,032-64/65 11,700-65/66
123 MUSTARD, J.F., MACDONALD, Ian, Laboratory, Sunnybrook Hosp., Toronto. A Study of the Activation of the Coagulation Mechanism during Alimentary Lipemia and its relationship to Thrombosis and Atherosclerosis. 23-57 1957 17 6 7						96,359-57/64 15,216-64/65 15,520-65/66
124 DANCEY, T.E., LUNDELL, F.W., MACPHERSON, A.S., ARANAS, A., Psychiatry, Queen Mary Veterans Hospital, Montreal. A Study of the Psychodynamic and Social Aspects of the Compensation problem. 25-57 1957 39 32 18						3,600-60/61 Nil
125 WOOLF, C.H., Cardio-Respiratory Function Laboratory, Sunnybrook Hosp., Toronto. Co-ordinated Study on Chronic Bronchitis. 27-57 1957 10 30 8						49,526-57/64 8,656-64/65 8,810-65/66

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List No.	Project Title				Financial History
No.	Project No., Year of Initiation, Categories A, B and C				
126	COPP, D.H., McINTOSH, H.W., Laboratory, Shaughnessy Hosp., Vancouver				\$ 13,210-61/64
	Studies of Metabolic Bone Disease and Disorders of Calcium Metabolism.				Nil
	15-58 1958	17	30	13	
127	McINTOSH, H.W., Laboratory, Shaughnessy Hosp., Vancouver.				2,000-60/61
	Metabolic Studies on patients with Renal Calculi.				Nil
	17-58 1958	17	30	18	
128	SNIDAL, D.P., Cardio-Respiratory Function Laboratory, Deer Lodge Hosp., Winnipeg.				52,810-58/64
	Co-ordinated Study on Chronic Bronchitis.				10,542-64-65
	26-58 1958	10	30	8	14,700-65/66
129	ZINGG, Walter, NICKERSON, M., Surgery, Deer Lodge Hosp., Winnipeg.				1,000-59/64
	A Study in the Alterations in Maximum Muscle Blood Flow produced by Drugs.				Nil
	4-59 1959	46	28	18	
130	ARONOFF, A., HALPENNY, G.W., Medicine, Queen Mary Veterans Hosp.,				12,081-59/64
	Studies in the Pathogenesis, Diagnosis and Treatment of various forms of Liver Disease.				4,611-64/65
	9-59 1959	20	11/28	3	8,450-65/66
131	BATES, David, Cardio-Respiratory Function Laboratory, Royal Victoria Hosp., Montreal.				27,300-59-64
	Co-ordinated Study on Chronic Bronchitis.				3,850-64/65
	18-59 1959	10	30	8	4,200-65/66
132	HARRIS, W.R., Surgery, Sunnybrook Hosp., Toronto.				11,108-60/64
	Follow-up Studies on Amputations and Prostheses.				200-64/65
	5-60 1960	46	29	13	4,800-65/66
133	THOMSON, A.E., Laboratory, Deer Lodge Hosp., Winnipeg.				8,120-61/63
	In Vivo Dialysis in the Management of Subjects with Renal Failure.				Nil
	9-61 1961	10	17	10	
134	DANCEY, T.E., LUNDELL, F.W., MacPHERSON, A.S., Psychiatry, Queen Mary Veterans and Ste. Anne's Hosp., Montreal.				43,173-61/64
	Psychiatric Research Program.				13,000-64/65
	10-61 1961	39	32	5	14,750-65/66
135	DANCEY, T.E., LUNDELL, F.W., CZANK, J., Psychiatry, Queen Mary Veterans Hosp., Montreal.				Nil
	A Study of Critical Flicker Fusion Frequency in Different Groups of Schizophrenic Patients.				
	12-61 1961	39	32	5	
136	MITCHELL, J.C., Medicine, Shaughnessy Hosp., Vancouver.				8,400-61/64
	The Distribution Patterns of Psoriasis - Observations on the Koebner Response.				Nil
	20-61 1961	20	10	12	
137	DOWER, Gordon E., Medicine, Shaughnessy Hosp., Vancouver.				710-62/63
	Clinical Trial of the Polarcardiograph (PCG)				Nil
	28-61 1961	20	8	7	
138	NICHOLLS, Doris, Laboratory, Westminster Hosp., London.				Nil
	Biochemical Studies of Normal and Diseased Kidneys.				
	1-62 1962	17	6	10	
139	MacKENZIE, Ian, Surgery, Camp Hill Hospital, Halifax.				Nil
	Investigation of (a) Encephalopathic substance and (b) Anti-Viral substance in Human Splenic extract.				
	4-62 1962	46	39	19	

NOT FOR PUBLICATION

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Director, Department, Institution					Financial History
List Project Title	No.	Project No., Year of Initiation, Categories A, B and C			
140 PATTEE, G.J., MURPHY, B.E., Laboratory, Queen Mary Veterans Hosp., Montreal. Protein-binding of Cortisol in various conditions.	9-62	1962	10	6/30	18 Nil
141 GAULT, H.M., Laboratory, Queen Mary Veterans Hospital, Montreal. Plasma P.S.P. Index of Renal Function.	11-62	1962	17	6	19 7,985-62/64 3,314-64/65 5,200-65/66
142 SMYTHE, Hugh A., Medicine, Sunnybrook Hosp., Toronto. A Study of the Influence of Diseases, Diets, and Drugs on the Metabolism of Uric Acid.	13-62	1962	20	6/30	3 4,700-62/64 194-64/65 4,595-65/66
143 McINTOSH, H.W., DARRACH, M., Laboratory, Shaughnessy Hosp., Vancouver Release of Calcium Chelating Agents by Kidney Enzymes.	14-62	1962	17	6	10 Nil
144 MORTON, H.S., Surgery, Queen Mary Veterans Hosp., Montreal. Establishment of Basic Facilities for Research in Surgery.	16-62	1962	46	8	18 Nil 2,810-64/65 6,220-65/66
145 AINSLIE, E., Medicine, Sunnybrook Hosp., Toronto. The Effect of the Kind of Fat in the Diet on Morbidity and Mortality in an Aging Male Population.	26-62	1962	20	6/15	18 10,098-62/64 15,314-64/65 19,265-65/66
146 BAYNE, J.R.D., Physical Medicine, Ste. Anne's Hospital, Ste. Anne de Bellevue, P.Q. A project to test the response of War Veterans with a long term Ethanol Addiction to Psycho-Social Therapy in a Domiciliary Care Setting.	28-62	1962	36	33/37	5 1,500-62/64 2,385-64/65 3,480-65/66
147 BROWN, A.N., Laboratory, Colonel Belcher Hosp., Calgary. Standardization of Techniques in the Disc-plate Method of Antibiotic Sensitivity Testing.	29-62	1962	17	5	19 Nil
148 DANCEY, T.E., LUNDELL, F.W., KRAL, A.V., MACPHERSON, A.S. Psychiatry, Queen Mary Veterans Hosp., Montreal. A Study of the Psychodynamic, Social and Medical Problems of the Hong-Kong Prisoners-of-War. (Psychiatric Study).	5-63	1963	39	32/37	18 Nil
149 THOMSON, A.E., Laboratory, Deer Lodge Hosp., Winnipeg. The effect of Adrenergic Blockade on the Vascular Dynamics of Clinical Shock.	6-63	1963	10	19	18 Nil
150 PRATT-JOHNSON, John A., Ophthalmology, Shaughnessy Hosp., Vancouver The Influence of Systemic Vascular Hypertension and Arteriosclerosis on the progress of Visual Field Changes in Open Angle Glaucoma.	10-63	1963	26	32	7 386-63/64 1,513-64/65 2,010-65/66
151 KENNING, Stuart P., Medicine, Veterans Hosp., Victoria. A Clinical Study to Evaluate the Maximal Expiratory Flow Rate (MEFR) in Routine Pre-operative Assessment.	18-63	1963	20	19	18 Nil
152 FILTEAU, Georges, Medicine, Ste. Foy Hosp., Quebec. Deshydrogénase lactique et aldolase sériques dans l'artériosclérose, l'arthrite et l'activité musculaire.	19-63	1963	20	6	18 Nil 530-64/65 2,344-65/66

NOT FOR PUBLICATION

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Director, Department, Institution					
List No.	Project Title	Project No., Year of Initiation, Categories A, B and C			
					Financial History
153	GREIG, J.H., WILLIAMS, L.R., Surgery, Shaughnessy Hosp., Vancouver Simultaneous study of bladder dynamics using cinefluorography and manometry. 21-63	1963	41	30	10
154	BONDY, D.C., Medicine, Westminster Hosp., London. Research on Post Gastrectomy Problems and on Intestinal Absorption. 1-64	1964	20	6	9
155	PATERSON, J.C., CARNOLL, S.E., Laboratory, Westminster Hosp., London. A Combined Radiological and Pathological Study of Occlusive Lesions of the Carotid-vertebral Artery System. 2-64	1964	19	27/35	7
156	DUNCAN, I.B.R., Laboratory, Westminster Hosp., London, Ont. Study of the Epidemiology and Biological Properties of Atypical Group III Staphylococci. 3-64	1964	19	6/13	19
157	DRANCE, S.M., PRATT-JOHNSON, J.A., Ophthalmology, Shaughnessy Hosp., Vancouver. Study of the influence of intraocular pressure on retinal sensitivity and electroretinogram. 7-64	1964	26	23	19
158	GOFTON, J.P., Medicine, Shaughnessy Hosp., Vancouver, B.C. A Study of the Moving Normal and Osteoarthritic Hip by Cinefluoroscopy. 8-64	1964	20	19	13
159	LEVY, S.W., Laboratory, Queen Mary Veterans Hosp., Montreal Lysosomal Enzymes in Inflammation and Disease. 12-64	1964	17	6	18
160	ERDOGAN, M., Orthopaedics, Camp Hill Hospital, Halifax, N.S. A Study of the Prolapsed Intervertebral Disc Syndrome with follow-up of cases treated (a) by operation, and (b) conservatively. 13-64	1964	46	38	13
161	OGRYZLO, M.A., SMYTHE, H.A., Medicine, Sunnybrook Hosp., Toronto. Reduction of Hyperuricemia with Pyrazolopyrimidine (HPF) and Sulfapyrazone in patients with Gout and other Diseases. 18-64	1964	19	32/20	7
162	LAWSON, G.A., GODFREY, G.M., Physical Medicine, Sunnybrook Hosp., Toronto. Study of Pressure on the Skin of Weight Bearing Areas of Human Beings under Normal and Abnormal Conditions. 19-64	1964	36	29	18
163	WALSH, G.C., McINTOSH, H.W., CARRUTHERS, B.M., SERAGLIA, M., Medicine, Shaughnessy Hospital, Vancouver, B.C. Study of Body Composition in Patients with Congestive Heart failure Before and After the Use of Diuretics. 22-64	1964	20	6	7
164	JOHNSON, G.E., Nursing, Head Office, Ottawa. Quality and Quantity of Nursing Care Required in D.V.A. Hospitals. 25-64	1964	23	20	19
165	MITCHELL, J.C., Medicine, Shaughnessy Hosp., Vancouver, B.C. Investigation of Allergy to Lichens. 1-65	1965	20	10	1
166	HOLUBITSKY, I.B., BOGOCH, A., Surgery, Shaughnessy Hosp., Vancouver Clinical and Experimental Studies of Stomal (Recurrent) Peptic Ulceration. 2-65	1965	46	19/11	9

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Director, Department, Institution						
List No.	Project Title	Year of Initiation, Categories A, B and C				Financial History
167	GAGNON, P.M., Laboratory, Ste.Foy Hosp., Quebec, P.Q. Etude immuno-électrophorétique de l'urine humaine normale et pathologique. 3-65	1965	31	18	10	\$ 4,644-65/66
168	MANCHESTER, J.S., PATERSON, J., Radiology, Camp Hill Hosp., Halifax, N.S. Radiological Findings in Chronic Bronchitis 4-65	1965	41	27	8	1,800-65/66
169	HODGES, W.E., Audiology, Sunnybrook Hosp., Toronto, Ont. Correlation of Conversational Voice to Assessment by Audiometric Procedures. 5-65	1965	45	24	6	5,000-65/66
170	WATT, D.L., Cardiology, Sunnybrook Hosp., Toronto. Development of a Machine for the Provision of External Cardiac Massage. 6-65	1965	20	8	7	1,500-65/66
171	SENN, J, MALKIN, D., MALKIN, A., HARRISON, A.W., Laboratory, Sunnybrook Hosp., Toronto, Ont. Hematologic and Nutritional Sequelae of Gastric Surgery for Duodenal Ulcer. 7-65	1965	9	6	9	6,050-65/66
172	MacCONNACHIE, H.F., Laboratory, Sunnybrook Hosp., Toronto, Ont. Effect of Corticosteroids on Bone Marrow Megakaryocytes of the Rat. 8-65	1965	31	11	13	423-65/66
173	LAWSON, G.A., Physical Medicine, Sunnybrook Hosp., Toronto, Ont. The Influence of Ultrasonic Heating on Nerve Conduction Velocities. 9-65	1965	36	8	6	450-65/66
174	LEWIS, J.A., SULLIVAN, H.F., Medicine, Westminster Hosp., London, Ont. Research in Education in the Pharmaceutical Sciences for hospital pharmacists. 10-65	1965	20	20/28	19	5,340-65/66
175	BAYNE, J.R.D., Physical Medicine, Ste. Anne's Hosp., Ste. Anne de Bellevue, P.Q. Changes in the Attitudes of Staff in the Face of Increasing Freedom of Choice and Action of Patients in a Long-Term General and Psychiatric Hospital. 11-65	1965	20	37	5	3,350-65/66
176	AUBERT, E., Laboratory, Ste. Anne's Hosp., Ste. Anne de Bellevue, P.Q. Classification and assessment of virulence of "atypical" Mycobacteria of human origin. 12-65	1965	4	5	1	250-65/66
177	PATTEE, C.J., MURPHY, B.E.P., Medicine, Queen Mary Veterans Hosp., Montreal, P.Q. A Study of Corticoids in cerebrospinal fluid. 13-65	1965	10	12	21	Nil
178	KINSELLA, T.D., Medicine, Queen Mary Veterans Hosp., Montreal, P.Q. Rheumatoid (ankylosing) spondylitis: long-term follow-up. 14-65	1965	20	19	13	Nil
179	HILTZ, J.W., Ophthalmology, Sunnybrook Hosp., Toronto, Ont. Heterochromic Cyclitis. 15-65	1965	26	23	6	Nil
180	McCULLOCH, J.C., Ophthalmology, Sunnybrook Hosp., Toronto, Ont. Pulmonary Insufficiency and its effects on the visual system. 16-65	1965	26	23/19	6	Nil

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Director, Department, Institution					
List	Project Title				
No.	Project No., Year of Initiation, Categories A, B and C				
					Financial History
181	McCULLOCH, J.C., HISCOX, P.E.A., Ophthalmology, Sunnybrook Hosp., Toronto, Ont. A Study of Progressive Anglo-Closure Glaucoma. 17-65 1965 26 23 6				\$ Nil
182	FRANKLING, S.R., LIDDY, B.S.L., Ophthalmology, Sunnybrook Hosp., Toronto, Ont. The use of Glycerol in Medical and Surgical Practice of Ophthalmology. 18-65 1965 23 28 6				Nil
183	HARPER, D.W., HISCOX, P.E.A., Ophthalmology, Sunnybrook Hosp., Toronto, Ont. Use of Fluorescein Fundus Photography in the differential diagnosis of lesions of the optic fundus. 19-65 1965 26 27 6				Nil
184	McCULLOCH, J.C., HISCOX, P.E.A., Ophthalmology, Sunnybrook hosp., Toronto, Ont. Systemic cholinesterase depression with ophthalmic anti-cholinesterase drug therapy. 20-65 1965 26 28/12 6				Nil
185	PARFITT, G.J., Dentistry, Shaughnessy Hosp., Vancouver, B.C. Physical Measurement of Tooth Supporting Structures in Individuals with Known Systemic Disease. 21-65 1965 11 9 9				Nil
186	CARROLL, S.E., Surgery, Westminster Hospital, London. Studies in Peripheral Vascular Disease. 22-65 1965 46 38 7				Nil
187	CARROLL, S.E., LEWIS, J.A., Surgery, Westminster Hospital, London. Cardio-pulmonary studies. 23-65 1965 46 19 7				Nil
188	CARROLL, S.E., Surgery, Westminster Hospital, London. Further investigation of problems in small vessel anastomoses. 24-65 1965 46 38 7				Nil

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Director, Department, Institution						
List No.	Project Title	Project No., Year of Initiation, Categories A, B and C				Financial History
101	PATTEE, C.J., C.I.U., Queen Mary Veterans Hospital, Montreal. Operation of Clinical Investigation Unit. 14-50	1950	10	19	18	\$ 399,566-50/63 34,178-63/64 44,750-64/65
102	PATERSON, J.G., C.I.U., Westminster Hosp., London. Operation of Clinical Investigation Unit. 17-50	1950	10	19	18	368,723-50/63 35,640-63/64 39,090-64/65
103	PATERSON, J.C., Laboratory, Westminster Hosp., London. Studies on Phlebothrombosis and Pulmonary Embolism 20-50	1950	17	27/38	7	21,996-50/54 Nil
104	OGRYZLO, M., C.I.U., Sunnybrook Hosp., Toronto. Operation of Clinical Investigation Unit. 21-50	1950	10	19	18	422,730-50/63 34,610-63/64 33,063-64/65
105	PLACE, R.E.G., Cardio-Respiratory Function Laboratory, Queen Mary Veterans Hosp., Montreal Continuation of Investigation of Aetiological Factors and Physiological Status in cases of Chronic Bronchitis and Bronchiectasis. 27-50	1950	10	19	8	90,232-50/63 8,120-63/64 8,020-64/65
106	McINTOSH, H.W., C.I.U., Shaughnessy Hospital, Vancouver. Operation of Clinical Investigation Unit. 29-50	1950	10	19	18	380,966-50/63 37,380-63/64 35,255-64/65
107	BOTTERELL, E.H., Surgery, Sunnybrook Hosp., Toronto Disturbances in Function of Paraplegic Patients. 46-50	1950	22	38	6	46,967-50/63 4,640-63/64 4,640-64/65
108	METCALFE, E.V., HOBBS, G.E., STEVENSON, J.A.F., LOVEGROVE, T.D. Psychiatry, Westminster Hosp., London. A Longitudinal Study of Schizophrenia, correlating biochemical and physiological measurements with psychiatric assessment. (The value of these measurements in the diagnosis and prognosis of this disease.) 31-51	1951	39	32	5	73,157-51/63 9,490-63/64 9,040-64/65
109	THOMSON, A.E., C.I.U., Deer Lodge Hosp., Winnipeg. Operation of Clinical Investigation Unit. 36-51	1951	10	19	18	215,537-51/63 40,551-63/64 40,600-64/65
110	GILPIN, R.E., Prosthetics, Sunnybrook Hosp., Toronto. Investigation of Materials and Design of Joints and Assemblies in Artificial Limbs and Orthopaedic Appliances. 48-51	1951	36	29	13	5,484-51/63 400-63/64 500-64/65
111	LEWIS, J.A., KAVELMAN, D.A. Medicine, Westminster Hosp., London The Continued Study of Hypertension - (a) Clinical Trials of New Drugs. (b) The Studies of Renal and General Hemodynamic Effects of Lowering the Blood Pressure. 49-51	1951	10	28	7	864-54/59 Nil
112	THOMSON, A.E., C.I.U., Deer Lodge Hosp., Winnipeg. Hypertension: Changes in Hemodynamics and Vascular smooth Muscle Tone produced by the Benzothiadiazines. 58-51	1951	10	6/30	7	25,060-51/63 Nil
113	BRANCH, A., Laboratory, Lancaster Hosp., Saint John. Survey of Antibiotic Laboratory Tests for Sensitivity and Resistance of Pathogenic Bacteria. 60-51	1951	17	5	19	60,110-51/63 6,720-63/64 2,400-64/65

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Director, Department, Institution						Financial History
List No.	Project Title					
Project No., Year of Initiation, Categories A, B and C						
114	PATERSON, J.C., Laboratory, Westminster Hosp., London.					\$ 73,082-52/63
	Blood Lipids and Atherosclerosis in Schizophrenics.					5,160-63/64
	14-52	1952	17	6/27	7	Nil
115	GORDON, C.A., Cardio-Respiratory Function Laboratory,					80,130-52/63
	Camp Hill Hosp., Halifax.					8,960-63/64
	Co-ordinated Study of Chronic Bronchitis.					9,260-64/65
	30-52(b)	1952	10	30	8	
116	PATERSON, J.C., Laboratory, Westminster Hosp., London.					36,919-53/63
	Factors in the Production of Coronary Artery Disease.					5,160-63/64
	35-52	1952	17	27	7	4,070-64/65
117	MACDONALD, Ian, Medicine, Sunnybrook Hosp., Toronto.					112,201-52/63
	The Clinical and Biochemical Study of Certain Aspects of					12,573-63/64
	Atherosclerosis.					11,873-64/65
	41-52	1952	20	19/6	7	
118	PATTEE, C.J., HOOD, A.B., MURPHY, B.E., Laboratory, Queen Mary					500-54/55
	Veterans Hosp., Montreal					Nil
	Study of Obesity.					
	10-54	1954	10	11/28	3	
119	SUTHERLAND, W.H., GOLBECK, J.C., Laboratory, Shaughnessy Hosp.,					61,902-54/63
	Vancouver.					7,890-63/64
	Investigation of the Control of Nosocomial Infections.					4,770-64/65
	23-54	1954	17	5	8	
120	NICHOLLS, Doris; BOCKING, D., ROSSITER, R.J.; STEVENSON, J.A.F.					1,757-55/63
	Laboratory, Westminster Hosp., London.					4,765-63/64
	The Metabolism of Amino Acids in Normal and Diseased States.					2,140-64/65
	10-55	1955	17	6/30	18	
121	OGRYZLO, M.A., DAUPHINEE, J.A., FLETCHER, A.A., Medicine,					18,690-55/63
	Sunnybrook Hosp., Toronto.					Nil-63/64
	Plasma Protein Studies: (paper electrophoresis and starch gel					2,440-64/65
	electrophoresis).					
	25-55	1955	20	6	18	
122	MACDONALD, I., EZRIN, G., Medicine, Sunnybrook Hosp., Toronto.					13,995-56/63
	Investigation of the Use of Radio-isotopes in Diagnosis, Treat-					2,400-63-64
	ment and Clinical Investigation. Continuation of investigation					4,900-64/65
	and treatment of Disorders of the Thyroid Gland with Radio-iodine.					
	27-55	1955	20	11	18	
123	DANCEY, T.E., LUNDELL, F.W., MESZAROS, A.F., Psychiatry,					Nil
	Queen Mary Veterans Hosp., Montreal.					
	Critical Assessment of Background Material of Schizophrenic Veterans.					
	16-56	1956	39	32	5	
124	KAYE, M., HALPENNY, G.W., Medicine, Queen Mary Veterans Hosp.,					51,895-56/63
	Montreal.					9,225-63/64
	A systematic Study of Various Aspects of Renal Physiology and					9,045-64/65
	Disease.					
	26-56	1956	20	30	10	
125	DANCEY, T.E., LUNDELL, F.W., Psychiatry, Queen Mary Veterans					Nil
	Hosp., Montreal.					
	The Ataractic Drugs.					
	33-56	1956	39	28	5	
126	DeJONG, D., BURNS, B.D., KRAL, A., WIGDOR, B., SOLIS-QUIROGA, O.H.					52,166-57/63
	Neurology, Queen Mary Veterans Hosp., Montreal.					10,850-63/64
	An Investigation of Parkinson's Syndrome.					11,050-64/65
	14-57	1957	22	38	6	

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Director, Department, Institution						Financial History
List No.	Project Title	Project No., Year of Initiation, Categories A, B and C				
127	MUSTARD, J.F., MACDONALD, Ian, Laboratory, Sunnybrook Hosp., Toronto A Study of the Activation of the Coagulation Mechanism during Alimentary Lipemia and its relationship to Thrombosis and Atherosclerosis. 23-57	1957	17	6	7	\$ 74,805-57/63 21,554-63/64 14,950-64/65
128	DANCEY, T.E., LUNDELL, F.W., MACPHERSON, A.S., ARANAS, A., Psychiatry, Queen Mary Veterans Hospital, Montreal. A Study of the Psychodynamic and Social Aspects of the Compensation problem. 25-57	1957	39	32	18	3,600-60/61 Nil
129	WOOLF, C.R., Cardio-Respiratory Function Laboratory, Sunnybrook Hospital, Toronto. Co-ordinated Study on Chronic Bronchitis. 27-57	1957	10	30	8	41,593-57/63 7,933-63/64 8,208-64/65
130	COPP, D.H., McINTOSH, H.W., Laboratory, Shaughnessy Hosp., Vancouver Studies of Metabolic Bone Disease and Disorders of Calcium Metabolism. 15-58	1958	17	30	13	9,190-61/63 4,020-63/64 Nil
131	McINTOSH, H.W., Laboratory, Shaughnessy Hosp., Vancouver. Metabolic Studies on patients with Renal Calculi. 17-58	1958	17	30	18	2,000-60/61 Nil
132	SNIDAL, D.P., Cardio-Respiratory Function Laboratory, Deer Lodge Hosp., Winnipeg. Co-ordinated Study on Chronic Bronchitis. 26-58	1958	10	30	8	41,810-58/63 11,000-63/64 12,280-64/65
133	ZINGG, Walter, NICKERSON, M., Surgery, Deer Lodge Hosp., Winnipeg. A Study of the Alterations in Maximum Muscle Blood Flow produced by Drugs. 4-59	1959	46	28	18	700-59/63 300-63/64 450-64/65
134	ARONOFF, A., HALPENNY, G.W., Medicine, Queen Mary Veterans Hosp., Montreal. Studies in the Pathogenesis, Diagnosis and Treatment of various forms of Liver Disease. 9-59	1959	20	11/28	3	7,798-59/63 4,283-63/64 4,433-64/65
135	MARTIN, W.S., SHAPIRO, L.P., Laboratory, Queen Mary Veterans Hosp., Montreal. The Detection of Variations of Blood Clotting by Electrical Means. 17-59	1959	17	8	7	4,000-62/63 750-63/64 875-64/65
136	BATES, David, Cardio-Respiratory Function Laboratory, Royal Victoria Hosp., Montreal. Co-ordinated Study on Chronic Bronchitis. 18-59	1959	10	30	8	23,000-59/63 4,300-63/64 3,600-64/65
137	HARRIS, W.R., Surgery, Sunnybrook Hosp., Toronto. Follow-up Studies on Amputations and Prostheses. 5-60	1960	46	29	13	10,358-60/63 750-63/64 4,979-64/65
138	THOMSON, A.E., Laboratory, Deer Lodge Hosp., Winnipeg. In Vivo Dialysis in the Management of Subjects with Renal Failure. 9-61	1961	10	17	10	8,120-61/63 Nil
139	DANCEY, T.E., LUNDELL, F.W., MacPHERSON, A.S., Psychiatry, Queen Mary Veterans and Ste. Anne's Hosp., Montreal. Psychiatric Research Program. 10-61	1961	39	32	5	27,668-61/63 15,505-63/64 13,173-64/65

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Director, Department, Institution						Financial History
List No.	Project Title	Project No.	Year of Initiation	Categories A, B and C		
140	MITCHELL, J.C., Medicine, Shaughnessy Hosp., Vancouver The Distribution Patterns of Psoriasis - Observations on the Koebner Response.					\$ 5,400-61/63 3,000-63/64 Nil
	20-61	1961	20	10	12	
141	FILTEAU, Georges, MORIN, E., Medicine, Ste. Foy Hosp., Quebec. Chromatographic Determination of Vitamin D in Avitaminosis and Alcoholism.					3,830-61/63 Nil 2,050-64/65
	21-61	1961	20	6	19	
142	DOWER, Gordon E., Medicine, Shaughnessy Hosp., Vancouver. Clinical Trial of the Polarcardiograph (PCG)					710-62/63 Nil
	28-61	1961	20	8	7	
143	NICHOLLS, Doris, Laboratory, Westminster Hosp., London. Biochemical Studies of Normal and Diseased Kidneys.					Nil
	1-62	1962	17	6	10	
144	MacKENZIE, Ian, Surgery, Camp Hill Hospital, Halifax. Investigation of (a) Encephalopathic substance and (b) Anti-Viral substance in Human Splenic extract.					Nil
	4-62	1962	46	39	19	
145	PATTEE, C.J., HOOD, A.B., MURPHY, B.E., Laboratory, Queen Mary Veterans Hosp., Montreal. Protein-binding of Cortisol in various conditions.					Nil
	9-62	1962	10	6/30	18	
146	GAULT, H.M., Laboratory, Queen Mary Veterans Hosp., Montreal. Plasma P.S.P. Index of Renal Function.					3,705-62/63 4,280-63/64 4,865-64/65
	11-62	1962	17	6	19	
147	GAULT, H.M., Laboratory, Queen Mary Veterans Hosp., Montreal. Enzyme Studies in Disease of Lung, G.U. Tract and Liver.					245-62/63 Nil
	12-62	1962	17	6	19	
148	SMYTHE, Hugh A., Medicine, Sunnybrook Hosp., Toronto. A Study of the Influence of Diseases, Diets, and Drugs on the Metabolism of Uric Acid.					4,700-62/63 Nil 3,800-64/65
	13-62	1962	20	6/30	3	
149	McINTOSH, H.W., DARRACH, M., Laboratory, Shaughnessy Hosp., Vancouver Release of Calcium Chelating Agents by Kidney Enzymes.					Nil
	14-62	1962	17	6	10	
150	FILTEAU, Georges, Laboratory, Ste. Foy Hospital, Quebec. Determination of Gonadotropins in Health and Disease by paper Electrophoresis.					3,893-62/63 3,593-63/64 4,450-64/65
	15-62	1962	17	6	18	
151	MONTON, H.S., Surgery, Queen Mary Veterans Hosp., Montreal. Establishment of Basic Facilities for Research in Surgery.					Nil 6,080-64/65
	16-62	1962	46	8	18	
	Sunnybrook Hospital, Toronto.					
152	AINSLIE, E., Medicine, Shaughnessy Hosp., Vancouver. The Effect of the Kind of Fat in the Diet on Morbidity and Mortality in an Aging Male Population.					4,225-62/63 5,873-63/64 20,314-64/65
	26-62	1962	20	6/15	18	
153	BAYNE, J.R.D., Physical Medicine, Ste. Anne's Hospital, Ste. Anne de Bellevue, P.Q. A project to test the response of War Veterans with a long term Ethanol Addiction to Psycho-Social Therapy in a Domiciliary Care Setting.					1,500-62/63 Nil 5,400-64/65
	28-62	1962	36	33/37	5	

NOT FOR PUBLICATION

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Director, Department, Institution					
List No.	Project Title	Project No., Year of Initiation, Categories A, B and C			
					Financial History
154	BROWN, A.N., Laboratory, Colonel Belcher Hosp., Calgary. Standardization of Techniques in the Disc-plate Method of Antibiotic Sensitivity Testing. 29-62	1962	17	5	19
					\$ Nil
155	BAYNE, J.R.D., Physical Medicine, Ste. Anne's Hosp., Ste. Anne de Bellevue Long Term Antibiotic Therapy in Patients with Chronic Pyelonephritis: Assessment of Clinical Effectiveness and Assessment of the effect of Antibiotics on Digestibility of Food in these patients. 2-63	1963	36	5	10
					Nil
156	PATTEE, C.J., HOOD, A.B., MURPHY, B., Medicine, Queen Mary Veterans Hosp., Montreal. Pituitary-adrenal function following short-term steroid Therapy. 3-63	1963	10	11	18
					Nil
157	DANCEY, T.E., LUNDELL, F.W., KRAL, A.V., MACPHERSON, A.S. Psychiatry, Queen Mary Veterans Hosp., Montreal. A Study of the Psychodynamic, Social and Medical Problems of the Hong-Kong Prisoners-of-War. (Psychiatric Study). 5-63	1963	39	32/37	18
					Nil
158	THOMSON, A.E., Laboratory, Deer Lodge Hosp., Winnipeg. The effect of Adrenergic Blockade on the Vascular Dynamics of Clinical Shock. 6-63	1963	10	19	18
					Nil 960-64/65
159	FAHRNI, Brock M., Physical Medicine, Shaughnessy Hosp., Vancouver. Investigation of various factors leading to premature application for War Veterans Allowance. 7-63	1963	36	37	18
					6,720-63/64 6,720-64/65
160	PRATT-JOHNSON, John A., Ophthalmology, Shaughnessy Hosp., Vancouver. The Influence of Systemic Vascular Hypertension and Arterio- sclerosis on the progress of Visual Field Changes in Open Angle Glaucoma. 10-63	1963	26	32	7
					386-63/64 2,100-64/65
161	KENNING, Stuart P., Medicine, Veterans Hosp., Victoria. A Clinical Study to Evaluate the Maximal Expiratory Flow Rate (MEFR) in Routine Pre-operative Assessment. 18-63	1963	20	19	18
					Nil
162	FILTEAU, Georges, Medicine, Ste. Foy Hosp., Quebec. Determination of Lactic Dehydrogenase and Serum Aldolase in Arteriosclerosis, Arthritis and Muscular Activity. 19-63	1963	20	6	18
					Nil 500-64/65
163	BALFOUR, J.A., Medicine, Shaughnessy Hosp., Vancouver. A Study of Haemolytic Complications and Electrolyte Changes During and following T.U.P.R. and their significance. 20-63	1963	20	6	18
					Nil
164	BONDY, D.C., Medicine, Westminster Hosp., London. Research on Post Gastrectomy Problems and on Intestinal Absorption. 1-64	1964	20	6	9
					Nil
165	PATERSON, J.G., CARROLL, S.E., Laboratory, Westminster Hosp., London. A Combined Radiological and Pathological Study of Occlusive Lesions of the Carotid-vertebral Artery System. 2-64	1964	19	27/35	7
					Nil
166	DUNCAN, I.B.R., Laboratory, Westminster Hosp., London. Study of the Epidemiology and Biological Properties of Atypical Group III Staphylococci. 3-64	1964	19	6/13	19
					4,070-64/65

NOT FOR PUBLICATION

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List No.	Project Title	Project No., Year of Initiation, Categories A, B and C				Financial History
167	LOVATT, G.E., Medicine, Westminster Hosp., London. Obesity and Skin Fold Thickness. 4-64	1964	19	6	3	\$ Nil
168	LOVATT, G.E., Medicine, Westminster Hosp., London. Use of Prednisone Glycosuria Test in Detection of Pre Diabetes. 5-64	1964	19	6	3	Nil
169	DOIG, D.N.W., COONS, W.H., Psychiatry, Camp Hill Hosp., Halifax. Visual Recognition Thresholds and Disorders of Personality. 6-64	1964	20	32	5	3,580-64/65
170	DRANCE, S.M., PRATT-JOHNSON, J.A., Ophthalmology, Shaughnessy Hosp., Vancouver. Study of the influence of intraocular pressure on retinal sensitivity and electroretinogram. 7-64	1964	26	23	19	7,212-64/65
171	GOFTON, J.P., Medicine, Shaughnessy Hosp., Vancouver. A Study of the Moving Normal and Osteoarthritic Hip by Cinefluoroscopy. 8-64	1964	20	19	13	Nil
172	SIMPSON, R.E., Anaesthesia, Shaughnessy Hosp., Vancouver. The Effect of General Anaesthesia on the B.S.P. Excretion Rate. 9-64	1964	20	2	19	Nil
173	DUCLOS, G.N., SCHIRMER, K.E., Queen Mary Veterans Hosp., Montreal. Microfilmphotography of the Ocular Fundus. 10-64	1964	26	23	6	1,920-64/65
174	LEVY, S.W., Queen Mary Veterans Hosp., Montreal. Lysosomal Enzymes in Inflammation and Disease. 12-64	1964	17	6	18	3,300-64/65
175	ERDOGAN, M., Orthopaedics, Camp Hill Hosp., Halifax, N.S. A Study of the Prolapsed Intervertebral Disc Syndrome with follow-up of cases treated (a) by operation, and (b) conservatively. 13-64	1964	46	38	13	2,592-64/65
176	STEIN, H., MORGAN, J., Ophthalmology, Sunnybrook Hosp., Toronto. Surgical application of the Cryostat. 14-64	1964	26	23	6	Nil
177	MORGAN, John, Ophthalmology, Sunnybrook Hosp., Toronto. Thiotopa to prevent recurrence of Pterygium. 15-64	1964	26	28/23	6	Nil
178	LIDDY, B.S.L., Ophthalmology, Sunnybrook Hosp., Toronto. Use of liquid nitrogen on superficial ext. skin lesions around the orbit. 16-64	1964	26	26	6	Nil
179	LIDDY, B.S.L., Ophthalmology, Sunnybrook Hosp., Toronto. To enquire into possible relationships between respiratory anoxia and ocular disease. 17-64	1964	26	23	6	Nil
180	OGRYZLO, M.A., SMYTHE, H.A., Medicine, Sunnybrook Hosp., Toronto. Reduction of Hyperuricemia with Pyrazolopyrimidine (HPP) and Sulfipyrazone in patients with Gout and other Diseases. 18-64	1964	19	32/20	7	4,020-64/65
181	LAWSON, G.A., GODFREY, C.M., Physical Medicine, Sunnybrook Hosp., Toronto Study of Pressure on the Skin of Weight Bearing Areas of Human Beings under Normal and Abnormal Conditions. 19-64	1964	36	29	18	800-64.65

NOT FOR PUBLICATION

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List Project Title					Financial History
No.	Project No.	Year of Initiation	Categories A, B and C		
182	MORGAN, John, Ophthalmology, Sunnybrook Hosp., Toronto. Clinical trial of Silicone fluid for use with Artificial Eyes.				\$ Nil
	20-64	1964	26	28/23 6	
183	BOGOGH, A., Medicine, Shaughnessy Hosp., Vancouver. The Effects of Pancreozymin and Secretin on Pancreatic Secretion in Post-gastrectomy Patients.				Nil
	21-64	1964	19	6 18	

DEPARTMENT OF VETERANS AFFAIRS

List No.	Director, Department, Institution					Financial History
	Project Title					
<u>Project No., Year of Initiation, Categories A,B and C</u>						
101	PATTEE, C.J., C.I.U., Queen Mary Veterans Hosp., Montreal					\$33,878-61/62
	Operation of Clinical Investigation Unit					32,961-62/63
	14-50	1950	10	19	18	34,178-63/64
102	PATERSON, J.C., C.I.U., Westminster Hosp., London					26,663-61/62
	Operation of Clinical Investigation Unit					31,110-62/63
	17-50	1950	10	19	18	35,640-63/64
103	PATERSON, J.C., Laboratory, Westminster Hosp., London					Nil
	Studies on Phlebothrombosis and Pulmonary Embolism					
	20-50	1950	17	27/38	7	
104	OGRYZLO, M., C.I.U., Sunnybrook Hosp., Toronto					32,800-61/62
	Operation of Clinical Investigation Unit					31,915-62/63
	21-50	1950	10	19	18	34,610-63/64
105	PLACE, R.E.G., Cardio-Respiratory Function Laboratory					8,120-61/62
	Queen Mary Veterans Hosp., Montreal					8,120-62/63
	Continuation of Investigation of Aetiological Factors					8,120-63/64
	and Physiological Status in cases of Chronic					
	Bronchitis and Bronchiectasis					
	27-50	1950	10	19	8	
106	McINTOSH, H.W., C.I.U., Shaughnessy Hosp., Vancouver					27,288-61/62
	Operation of Clinical Investigation Unit					27,868-62/63
	29-50	1950	10	19	18	37,380-63/64
107	BOTTERELL, E.H., Surgery, Sunnybrook Hosp., Toronto					4,640-61/62
	Disturbances in Function of Paraplegic Patients					4,640-62/63
	46-50	1950	22	38	6	4,640-63/64
108	DAUPHINEE, J.A., Medicine, Sunnybrook Hosp., Toronto					7,080-61/62
	Studies of Liver Function in Chronic Liver Diseases					7,080-62/63
	19-51	1951	20	6/11	9	7,080-63/64
109	METCALFE, E.V., HOBBS, G.E., STEVENSON, J.A.F.,					8,600-61/62
	LOVEGROVE, T.D., Psychiatry, Westminster Hosp., London					8,600-62/63
	A Longitudinal Study of Schizophrenia, correlating					9,490-63/64
	biochemical and physiological measurements with					
	psychiatric assessment. (The value of these measure-					
	ments in the diagnosis and prognosis of this disease.)					
	31-51	1951	39	32	5	
110	THOMSON, A.E., C.I.U., Deer Lodge Hosp., Winnipeg					35,140-61/62
	Operation of Clinical Investigation Unit					26,990-62/63
	36-51	1951	10	19	18	40,551-63/64
111	GILPIN, R.E., Prosthetics, Sunnybrook Hosp., Toronto					125-62/63
	Investigation of Materials and Design of Joints and					400-63/64
	Assemblies in Artificial Limbs and Orthopaedic Appliances					
	48-51	1951	36	29	13	
112	LEWIS, J.A., KAVELMAN, D.A., Medicine, Westminster Hosp.,					Nil
	London					
	The Continued Study of Hypertension -					
	(a) Clinical Trials of New Drugs					
	(b) The Studies of Renal and General Hemodynamic Effects					
	of Lowering the Blood Pressure					
	49-51	1951	10	28	7	
113	THOMSON, A.E., C.I.U., Deer Lodge Hosp., Winnipeg					500-61/62
	Hypertension: Changes in Hemodynamics and Vascular smooth					1,100-62/63
	Muscle Tone produced by the Benzothiadiazines.					Nil
	58-51	1951	10	6/30	7	

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	Project Title				
	Project No., Year of Initiation, Categories A,B and C				
114	BRANCH, A., Laboratory, Lancaster H., Saint John				\$ 6,720-61/62
	Survey of Antibiotic Laboratory Tests for Sensitivity				6,720-62/63
	and Resistance of Pathogenic Bacteria				6,720-63/64
	60-51	1951	17	5 19	
115	PATERSON, J.C., Laboratory, Westminster Hosp., London				10,330-61/62
	Blood Lipids and Atherosclerosis in Schizophrenics				9,180-62/63
	14-52	1952	17	6/27 7	5,160-63/64
116	GORDON, C.A., Cardio-Respiratory Function Laboratory,				1,440-62/63
	Camp Hill Hosp., Halifax				Nil
	Physiological Studies in the Treatment of Chronic				
	Pulmonary Disease				
	30-52(a)	1952	10	30 8	
117	GORDON, C.A., Cardio-Respiratory Function Laboratory				8,420-61/62
	Camp Hill Hosp., Halifax				8,780-62/63
	Co-ordinated Study of Chronic Bronchitis				8,960-63/64
	30-52(b)	1952	10	30 8	
118	PATERSON, J.C., Laboratory, Westminster Hosp., London				4,320-61/62
	Factors in the Production of Coronary Artery Disease				4,320-62/63
	35-52	1952	17	27 7	5,160-63/64
119	MACDONALD, Ian, Medicine, Sunnybrook Hosp., Toronto				13,035-61/62
	The Clinical and Biochemical Study of Certain				18,300-62/63
	Aspects of Atherosclerosis				12,573-63/64
	41-52	1952	20	19/6 7	
120	McINTOSH, H.W., Laboratory, Shaughnessy Hosp., Vancouver				Nil
	Determination of Blood Steroid Levels in Health and				
	Stress				
	1-54	1954	17	6/19 18	
121	PATTEE, C.J., HOOD, A.B., MURPHY, B.E., Laboratory,				Nil
	Study of Obesity				
	10-54	1954	10	11/28 3	
122	SUTHERLAND, W.H., COLBECK, J.C., Laboratory,				8,003-61/62
	Shaughnessy Hosp., Vancouver				8,153-62/63
	Investigation of the Control of Nosocomial Infections				7,890-63/64
	23-54	1954	17	5 8	
123	GURAVICH, Lionel, Medicine, Lancaster Hosp., Saint John				700-61/62
	Familial Xanthomatous Hypercholesteremia				Not active 62/63
	34-54	1954	20	6/19 7	
124	NICHOLLS, Doris, BOCKING, D., ROSSITER, R.J.,				200-61/62
	STEVENSON, J.A.F., Laboratory, Westminster Hosp. London				662-62/63
	The Metabolism of Amino Acids in Normal and Diseased				4,765-63/64
	States				
	10-55	1955	17	6/30 18	
125	OGRYZLO, M.A., DAUPHINEE, J.A., FLETCHER, A.A.,				2,440-61/62
	Medicine, Sunnybrook Hosp., Toronto				2,440-62/63
	Plasma Protein Studies: (paper electrophoresis and				Nil
	starch gel electrophoresis)				
	25-55	1955	20	6 18	
126	MACDONALD, I., EZRIN, C., Medicine, Sunnybrook Hosp.,				2,400-61/62
	Toronto				2,400-62/63
	Investigation of the Use of Radio-isotopes in Diagnosis,				2,400-63/64
	Treatment and Clinical Investigation. Continuation of				
	investigation and treatment of Disorders of the				
	Thyroid Gland with Radio-iodine				
	27-55	1955	20	11 18	

DEPARTMENT OF VETERANS AFFAIRS

Director, Department, Institution					Financial History
List No.	Project Title	Project No.	Year of Initiation	Categories, A, B and C	
127	DANCEY, T.E., LUNDELL, F.W., MESZAROS, A.F., Psychiatry Queen Mary Veterans Hosp., Montreal Critical Assessment of Background Material of Schizophrenic Veterans				\$ Nil
	16-56	1956	39	32 5	
128	KAYE, M., HALPENNY, G.W., Medicine, Queen Mary Veterans Hospital, Montreal A Systematic Study of Various Aspects of Renal Physiology and Disease				7,845-61/62 9,070-62/63 9,225-63/64
	26-56	1956	20	30 10	
129	DANCEY, T.E., LUNDELL, F.W., Psychiatry, Queen Mary Veterans Hosp., Montreal The Ataractic Drugs				Nil
	33-56	1956	39	28 5	
130	DeJONG, D., BURNS, B.D., KRAL, A., WIGDOR, B., SOLIS-QUIROGA, O.H., Neurology, Queen Mary Veterans Hosp., Montreal				9,300-61/62 10,900-62/63 10,850-63/64
	14-57	1957	22	38 6	
131	MUSTARD, J.F., MACDONALD, Ian, Laboratory, Sunnybrook Hosp., Toronto A Study of the Activation of the Coagulation Mechanism during Alimentary Lipemia and its relationship to Thrombosis and Atherosclerosis				19,310-61/62 17,906-62/63 21,554-63/64
	23-57	1957	17	6 7	
132	DANCEY, T.E., LUNDELL, F.W., MACPHERSON, A.S., ARANAS, A. Psychiatry, Queen Mary Veterans Hosp., Montreal A Study of the Psychodynamic and Social Aspects of the Compensation Problem.				Nil
	25-57	1957	39	32 18	
133	WOOLF, C.R., Cardio-Respiratory Function Laboratory, Sunnybrook Hosp., Toronto Co-ordinated Study on Chronic Bronchitis				8,830-61/62 7,783-62/63 7,933-63/64
	27-57	1957	10	30 8	
134	COPP, D.H. McINTOSH, H.W., Laboratory, Shaughnessy Hosp., Vancouver Studies of Metabolic Bone Disease and Disorders of Calcium Metabolism				5,170-61/62 4,020-62/63 4,020-63/64
	15-58	1958	17	30 13	
135	McINTOSH, H.W., Laboratory, Shaughnessy Hosp., Vancouver Metabolic Studies on patients with Renal Calculi				Nil
	17-58	1958	17	30 18	
136	HOWELL, D.A., Neurology, Queen Mary Veterans Hosp., Montreal An Investigation into the Cause of Signs and Symptoms in Intracranial Haemorrhage				1,728-61/62 1,728-62/63 1,800-63/64
	23-58	1958	22	21 7	
137	OGRYZLO, M.A., Laboratory, Sunnybrook Hosp., Toronto Effect of Dietary Factors and various Uricosuric Agents on the Renal Clearance of Uric Acid in Chronic Gout				3,780-61/62 3,780-62/63 3,870-63/64
	24-58	1958	10	6 3	
138	SNIDAL, D.P., Laboratory, Deer Lodge Hosp., Winnipeg The Relationship of Diffusing Capacity to Intrapulmonary Mixing in Normals and in Patients with Pulmonary Emphysema				Nil
	26-58(a)	1958	10	30 8	

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List No.	Director, Department, Institution	Project Title	Project No., Year of Initiation, Categories A,B and C	Financial History
139	SNIDAL, D.P.,	Cardio-Respiratory Function Laboratory, Deer Lodge Hosp., Winnipeg		\$11,420-61/62 11,200-62/63 11,000-63/64
		Co-ordinated Study on Chronic Bronchitis		
	26-58(b)	1958	10 30 8	
140	ZINGG, Walter, NICKERSON, M.,	Surgery, Deer Lodge Hosp., Winnipeg		150-61/62 200-62/63 300-63/64
		A Study of the Alterations in Maximum Muscle Blood Flow produced by Drugs		
	4-59	1959	46 28 18	
141	ARONOFF, A., HALPENNY, G.W.,	Medicine, Queen Mary Veterans Hosp., Montreal		3,830-61/62 3,743-62/63 4,283-63/64
		Studies in the Pathogenesis, Diagnosis and Treatment of various forms of Liver Disease		
	9-59	1959	20 11/28 3	
142	HARRISON, A.W.,	Surgery, Sunnybrook Hosp., Toronto		2,640-61/62 2,918-62/63 3,068-63/64
		A Study of the Hemostatic Defects found or Produced in Bleeding Patients		
	12-59	1959	46 17 7	
143	MARTIN, W.S., SHAPIRO, L.P.,	Laboratory, Queen Mary Veterans Hosp., Montreal		4,000-62/63 750-63/64
		The Detection of Variations of Blood Clotting by Electrical Means		
	17-59	1959	17 8 7	
144	BATES, David,	Cardio-Respiratory Function Laboratory, Royal Victoria Hosp., Montreal		1,700-61/62 4,800-62/63 4,300-63/64
		Co-ordinated Study on Chronic Bronchitis		
	18-59	1959	10 30 8	
145	PATTEE, C.J., HOOD, A.B., MURPHY, B.E.,	Laboratory, Queen Mary Veterans Hosp., Montreal		N11
		Corticosteroid Metabolism in Liver Disease		
	19-59	1959	10 11/30 19	
146	HARRIS, W.R.,	Surgery, Sunnybrook Hosp., Toronto		3,000-61/62 3,858-62/63 750-63/64
		Follow-up Studies on Amputations and Prostheses		
	5-60	1960	46 29 13	
147	THOMSON, A.E.,	Laboratory, Deer Lodge Hosp., Winnipeg		1,500-61/62 6,620-62/63
		In Vivo Dialysis in the Management of Subjects with Renal Failure		
	9-61	1961	10 17 10	N11
148	DANCEY, T.E., LUNDELL, F.W., MacPHERSON, A.S.,	Psychiatry, Queen Mary Veterans & Ste. Anne's Hosp. Montreal		13,058-61/62 14,610-62/63 15-505-63/64
		Psychiatric Research Program		
	10-61	1961	39 32 5	
149	DANCEY, T.E., LUNDELL, F.W., MacPHERSON, A.S.,	Psychiatry, Queen Mary Veterans Hosp., Montreal		N11
		Part I - Evaluation of Psychiatric Factors and Hydrocortisone production rates in these patients using C14 Hydrocortisone.		
		Part II - Evaluation of Hydrocortisone production rates and weight change in depressed patients, using C14 Hydrocortisone		
	11-61	1961	39 32 5	
150	DANCEY, T.E., LUNDELL, F.W., CZANK, J.,	Psychiatry, Queen Mary Veterans Hosp., Montreal		N11
		A Study of Critical Flicker Fusion Frequency in Different Groups of Schizophrenic Patients		
	12-61	1961	39 32 5	

Special Committee

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List No.	Director, Department, Institution	Project Title	Project No., Year of Initiation, Categories A,B and C	Financial History
151	MITCHELL, J.C., Medicine, Shaughnessy Hosp., Vancouver	The Distribution Patterns of Psoriasis - Observations on the Koebner Response	20-61 1961 20 10 12	\$ 2,400-61/62 3,000-62/63 3,000-63/64
152	FILTEAU, Georges, MORIN, E., Medicine, Ste. Foy Hosp., Quebec	Chromatographic Determination of Vitamin D in Avitaminosis and Alcoholism	21-61 1961 20 6 19	3,830-61/62 Not active-62/63 Nil
153	FILTEAU, Georges, Laboratory, Ste. Foy Hosp., Quebec	Effect of a Light Meal on Blood Constituents	22-61 1961 17 6 19	4,743-62/63 275-63/64
154	DOWER, Gordon E., Medicine, Shaughnessy Hosp., Vancouver	Clinical Trial of the Polarcardiograph (PCG)	28-61 1961 20 8 7	710-62/63 Nil
155	NICHOLLS, Doris, Laboratory, Westminster Hosp., London	Biochemical Studies of Normal and Diseased Kidneys	1-62 1962 17 6 10	Nil
156	MacKENZIE, Ian, Surgery, Camp Hill Hosp., Halifax	Investigation of the Anti-viral properties of Human Splenic Extract	4-62 1962 46 39 19	Nil
157	McINTOSH, H.W., Laboratory, Shaughnessy Hosp., Vancouver	To determine the effect of Sulphated Polymannuronides (Paritol) on some aspects of Fat Metabolism	8-62 1962 17 6/28 7	200-62/63 Nil
158	PATTEE, C.J., HOOD, A.B., MURPHY, B.E., Laboratory, Queen Mary Veterans Hosp., Montreal	Protein-binding of Cortisol in various conditions	9-62 1962 10 6/30 18	Nil
159	GAULT, H.M., Laboratory, Queen Mary Veterans Hosp., Montreal	Serum P.S.P. Index of Renal Function	11-62 1962 17 6 19	3,705-62/63 4,280-63/64
160	GAULT, H.M., Laboratory, Queen Mary Veterans Hosp., Montreal	Enzyme Studies in Disease of Lung, G.U. tract and liver	12-62 1962 17 6 19	245-62/63 Nil
161	SMYTHE, Hugh A., Medicine, Sunnybrook Hosp., Toronto	A Study of the Influence of Diseases, Diets, and Drugs on the Metabolism of Uric Acid	13-62 1962 20 6/30 3	4,700-62/63 Nil
162	McINTOSH, H.W., DARRACH, M., Laboratory, Shaughnessy Hospital, Vancouver	Release of Calcium Chelating Agents by Kidney Enzymes	14-62 1962 17 6 10	Nil
163	FILTEAU, Georges, Laboratory, Ste. Foy Hospital, Quebec	Determination of Gonadotropins in Health and Disease by paper Electrophoresis	15-62 1962 17 6 18	3,893-62/63 3,593-63/64
164	SIMPSON, D.M., VanROOYEN, C.E., Laboratory, Camp Hill Hospital, Halifax	A Study of Virulence and Epidemic Potential Staphylococcus Pyogenes	17-62 1962 17 5/13 19	3,930-62/63 1,890-63/64

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List No.	Director, Department, Institution					Financial History
	Project Title					
	Project No., Year of Initiation, Categories A,B and C					
165	HARLOW, C.M., STEEVES, Lee, ACKMAN, R., Laboratory, Camp Hill Hosp., Halifax					3,905-62/63 4,055-63/64
	The Long Term Effect of Regular Exercise on Balanced Diets in which Fish is one of the Main Sources of Protein and unsaturated Fatty Acids on Males with - (1) Obesity, (2) Ischemic Heart Disease, (3) Familial Hypercholesteremia					
	18-62	1962	17	6	18	
166	NORVELL, T., Surgery, Camp Hill Hosp., Halifax					4,052-62/63
	An Investigation into the Blood Volumes of Certain Debilitated Elderly Patients who are Potential Candidates for Surgical Operations					Nil
	21-62	1962	46	5/15	18	
167	CAIRNS, J.C., YOUNG, C.H., HANDFORTH, Medicine, Camp Hill Hosp., Halifax					100-62/63
	A Study of Small Bowel Biopsy in the older patients					Nil
	22-62	1962	20	15/27	18	
168	BOGOCH, A., Medicine, Shaughnessy Hosp., Vancouver					Nil
	Undigested Meat Fibres in the Stools after Partial Gastrectomy					
	25-62	1962	20	6/38	9	
169	AINSLIE, E., Medicine, Shaughnessy Hosp., Vancouver					4,225-62/63
	The Effect of the Kind of Fat in the Diet on Morbidity and Mortality in an Aging Male Population					5,873-63/64
	26-62	1962	20	6/15	18	
170	BAYNE, J.R.D., Physical Medicine, Ste. Anne's Hospital Ste. Anne de Bellevue, Quebec					1,500-62/63
	A project to test the response of War Veterans with a long term Ethanol Addiction to Psycho-Social Therapy in a Domiciliary Care Setting					Nil
	28-62	1962	36	33/37	5	
171	LEWIS, J.A., Medicine, Westminster Hosp., London					Nil
	To Determine the Effects of Crystalline Glucagon on Blood Glucose Levels in Healthy Adult Males					
	1-63	1963	20	6	18	
172	BAYNE, J.R.D., Physical Medicine, Ste. Anne's Hospital, Ste. Anne de Bellevue, Quebec					Nil
	Long Term Antibiotic Therapy in Patients with Chronic Pyelonephritis: Assessment of Clinical Effectiveness and Assessment of the effect of Antibiotics on Digestability of Food in these patients					
	2-63	1963	36	5	10	
173	PATTEE, C.J., HOOD, A.B., MURPHY, B., Medicine, Queen Mary Veterans Hosp., Montreal					Nil
	Pituitary-adrenal function following short-term Steroid Therapy					
	3-63	1963	10	11	18	
174	GROWSHAW, Ronald H., Ophthalmology, Sunnybrook Hosp., Toronto					Nil
	Study of Etiology of Lens Opacities in Young People					
	4-63	1963	26	23	18	
175	DANCEY, T.E., LUNDELL, F.W., KRAL, A.V., MACPHERSON, A.S., Psychiatry, Queen Mary Veterans Hosp., Montreal					Nil
	5-63	1963	39	32/37	18	
176	THOMSON, A.E., Laboratory, Deer Lodge Hosp., Winnipeg					Nil
	The Effect of Adrenergic Blockade on the Vascular Dynamics of Clinical Shock					
	6-63	1963	10	19	18	

DEPARTMENT OF VETERANS AFFAIRS

List No.	Director, Department, Institution Project Title Project No., Year of Initiation, Categories A, B and C					Financial History
177	FAHRNI, Brock M., Physical Medicine, Shaughnessy Hosp., Vancouver Investigation of various factors leading to premature application for War Veterans Allowance 7-63 1963 36 37 18					\$6,720-63/64
178	PRATT-JOHNSON, John A., Ophthalmology, Shaughnessy Hosp., Vancouver The Influence of Systemic Vascular Hypertension and Arteriosclerosis on the progress of Visual Field Changes in Open Angle Glaucoma 10-63 1963 26 32 7					386-63/64
179	BOGOCH, A., Medicine, Shaughnessy Hosp., Vancouver A Double Blind Study of TORECAN (a new antiemetic) 11-63 1963 20 32 18					N11
180	BOGOCH, A., Medicine, Shaughnessy Hosp., Vancouver INDOCYANINE GREEN (ICG) - hepatic uptake in normal individuals and in those with liver disease 12-63 1963 20 32 18					N11
181	ROBERTS, Llewellyn, Medicine, Veterans Hosp., Victoria A Clinical Study of the Influence of "PERSANTIN" on Inter coronary Collateral Circulation and Patient Survival 13-63 1963 20 32 7					N11
182	McCULLOCH, Clement, Ophthalmology, Sunnybrook Hosp., Toronto Actinomyces Bovis as the Etiological Cause of Canaliculitis 14-63 1963 26 23 1					N11
183	McCULLOCH, Clement, Ophthalmology, Sunnybrook Hosp., Toronto Uveitis Survey 15-63 1963 26 23 18					N11
184	McCULLOCH, Clement, Ophthalmology, Sunnybrook Hosp., Toronto Branch Occlusions in Retinal Vessels 16-63 1963 26 23 27					N11
185	McCULLOCH, Clement, Ophthalmology, Sunnybrook Hosp., Toronto Macular degeneration - Clinical Appearance Correlated with Visual Acuity 17-63 1963 26 23 6					100-63/64
186	KENNING, Stuart P., Medicine, Veterans Hosp., Victoria A Clinical Study to Evaluate the Maximal Expiratory Flow Rate (MEFR) in Routine Pre-operative Assessment. 18-63 1963 20 19 18					N11
187	FILTEAU, Georges, Medicine, Ste. Foy Hosp., Quebec Determination of Lactic Dehydrogenase and Serum Aldolase in Arteriosclerosis, Arthritis and Muscular Activity 19-63 1963 20 6 18					N11
188	BALFOUR, J.A., Medicine, Shaughnessy Hosp., Vancouver Study of Haemolytic Complications and Electrolyte Changes during and following T.U.P.R. and their significance 20-63 1963 20 6 18					N11

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1962-63

<u>List</u>			
<u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
101	Dr. C.J. Pattes, Director of C.I.U., Queen Mary Veterans Hospital, Montreal, P.Q.	Operation of Clinical Investiga- tion Unit - Queen Mary Veterans Hospital. (Project 14-50)	Nil-1950-51 \$38,500-1951-52 34,340-1952-53 34,385-1953-54 36,460-1954-55 35,985-1955-56 36,505-1956-57 39,080-1957-58 24,042-1958-59 24,450-1959-60 28,980-1960-61 33,878-1961-62 32,961-1962-63
102	Dr. J.A. Lewis, Director of C.I.U., Westminster Hospital, London, Ont.	Operation of Clinical Investiga- tion Unit - Westminster Hospital. (Project 17-50)	Nil-1950-51 35,500-1951-52 34,946-1952-53 33,920-1953-54 35,330-1954-55 34,010-1955-56 33,900-1956-57 35,100-1957-58 22,484-1958-59 22,220-1959-60 23,540-1960-61 26,663-1961-62 31,110-1962-63
103	Dr. J.C. Paterson, Chief of Service - Laboratory, Dr. J.A. McLachlin, Consultant in Surgery, Westminster Hospital, London, Ont.	Studies on Phlebothrombosis and Pulmonary Embolism. (Project 20-50)	4,410-1950-51 8,051-1951-52 7,388-1952-53 2,147-1953-54 Nil thereafter
104	Dr. M. Ogryzlo, Director of C.I.U., Sunnybrook Hospital, Toronto, Ont.	Operation of Clinical Investiga- tion Unit - Sunnybrook Hospital. (Project 21-50)	Nil 1950-51 41,310-1951-52 42,100-1952-53 40,780-1953-54 38,030-1954-55 37,145-1955-56 39,225-1956-57 43,187-1957-58 22,638-1958-59 24,850-1959-60 28,750-1960-61 32,800-1961-62 31,915-1962-63
105	Dr. R.E.G. Place, Director, Cardio-respiratory Function Laboratory, Queen Mary Veterans Hospital, Montreal, P.Q.	Continuation of Investigation of Aetiological Factors and Physio- logical Status in cases of Chronic Bronchitis and Bronchiectasis. (part of Co-ordinated Study). (Project 27-50)	5,935-1950-51 7,570-1951-52 4,728-1952-53 4,908-1953-54 7,035-1954-55 5,080-1955-56 6,525-1956-57 7,820-1957-58 8,911-1958-59 7,990-1959-60 7,490-1960-61 8,120-1961-62 8,120-1962-63

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<u>List</u> <u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
106	Dr. H.W. McIntosh, Director of C.I.U., Shaughnessy Hospital, Vancouver, B.C.	Operation of Clinical Investiga- tion Unit - Shaughnessy Hospital. (Project 29-50)	\$ Nil-1950-51 37,368-1951-52 35,966-1952-53 35,880-1953-54 36,010-1954-55 36,730-1955-56 37,900-1956-57 39,440-1957-58 21,783-1958-59 21,360-1959-60 23,373-1960-61 27,288-1961-62 27,868-1962-63
107	Dr. E.H. Botterell, Chief Neurosurgeon, Sunnybrook Hospital, Toronto, Ont.	Disturbances in Function of Paraplegic Patients. (Project 46-50)	1,900-1950-51 3,940-1951-52 3,700-1952-53 2,952-1953-54 3,400-1954-55 3,640-1955-56 3,635-1956-57 3,640-1957-58 3,540-1958-59 3,700-1959-60 3,640-1960-61 4,640-1961-62 4,640-1962-63
108	Dr. J.A. Dauphinee, Part-time Consultant in Medicine, Sunnybrook Hospital, Toronto, Ont.	Studies of Liver Function in Chronic Liver Diseases. (Project 19-51)	3,860-1951-52 5,860-1952-53 4,835-1953-54 5,990-1954-55 3,850-1955-56 4,254-1956-57 3,300-1957-58 4,850-1958-59 6,360-1959-60 6,510-1960-61 7,080-1961-62 7,080-1962-63
109	Dr. C. McCulloch, Senior Consultant, Eye Department, Sunnybrook Hospital, Toronto, Ont.	Clinical Studies in Ophthalmology. (Project 22-51)	6,212-1951-52 500-1952-53 11-1953-54 Nil thereafter
110	Dr. E.V. Metcalfe, Chief of Psychiatry, Dr. G.E. Hobbs & Dr. J.A.F. Stevenson, Consultants in Psychiatry, Dr. T.D. Lovegrove, Medical Officer, Westminster Hospital, London, Ont.	A Longitudinal Study of Schizo- phrenia, correlating biochemical and physiological measurements with psychiatric assessment. (The value of these measurements in the diagnosis and prognosis of this disease.) (Project 31-51)	3,202-1951-52 3,660-1952-53 5,920-1953-54 5,120-1954-55 5,615-1955-56 5,340-1956-57 6,000-1957-58 6,300-1958-59 7,250-1959-60 7,550-1960-61 8,600-1961-62 8,600-1962-63

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<u>List No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
111	Dr. A.E. Thomson, Director of C.I.U., Deer Lodge Hospital, Winnipeg, Man.	Operation of Clinical Investiga- tion Unit - Deer Lodge Hospital. (Project 36-51)	\$ 2,400-1951-52 4,900-1952-53 9,860-1953-54 11,170-1954-55 17,140-1955-56 24,072-1956-57 26,280-1957-58 17,150-1958-59 18,180-1959-60 22,255-1960-61 35,140-1961-62 26,990-1962-63
112	Dr. C.E. Corrigan, Chief of Service, Surgery, Deer Lodge Hospital, Winnipeg, Man.	Review of Herniorrhaphy Records with special emphasis on Recurrence Rates. (Project 40-51)	350-1951-52 Nil thereafter
113	Mr. R.E. Gilpin, Manager, Prosthetic Services, Sunnybrook Hospital, Toronto, Ont.	Investigation of Materials and Design of Joints and Assemblies in Artificial Limbs and Ortho- paedic Appliances. (Project 48-51)	3,780-1951-52 533-1957-58 46-1958-59 500-1959-60 500-1960-61 Nil-1961-62 125-1962-63
114	Dr. J.A. Lewis, Chief of Service, Medicine; Dr. C.H. Lockwood, Clinical Chief - C.I.U.; Dr. D.A. Kavelman, Research Fellow, Westminster Hospital, London, Ont.	The Continued Study of Hypertension - (a) Clinical Trials of New Drugs. (b) The Studies of Renal and General Hemodynamic Effects of Lowering the Blood Pressure. (Project 49-51)	693-1954-55 171-1958-59 Nil thereafter
115	Dr. A.E. Thomson, Director of C.I.U., Deer Lodge Hospital, Winnipeg, Man.	Abnormalities of Sodium Homeostasis and Vascular Smooth Muscle Tone in Hypertension. (Project 58-51)	3,025-1951-52 1,850-1952-53 6,200-1953-54 6,865-1954-55 3,600-1955-56 600-1956-57 520-1957-58 350-1958-59 200-1959-60 250-1960-61 500-1961-62 1,100-1962-63

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<u>List</u>			
<u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
116	Dr. Arnold Branch, Chief of Service, Laboratory, Lancaster Hospital, Saint John, N.B.	Survey of Antibiotic Laboratory Tests for Sensitivity and Resistance of Pathogenic Bacteria. (Project 60-51)	\$ 304-1951-52 4,490-1952-53 6,300-1953-54 7,750-1954-55 5,170-1955-56 4,444-1956-57 5,550-1957-58 5,032-1958-59 3,740-1959-60 3,890-1960-61 6,720-1961-62 6,720-1962-63
117	Dr. J.C. Paterson, Chief of Service, Laboratory, Westminster Hospital, London, Ont.	Blood Lipids and Atherosclerosis in Schizophrenics. (Project 14-52)	3,040-1952-53 2,717-1953-54 5,165-1954-55 5,385-1955-56 6,300-1956-57 5,960-1957-58 7,045-1958-59 8,890-1959-60 9,070-1960-61 10,330-1961-62 9,180-1962-63
118	Dr. C.A. Gordon, Medical Specialist, Camp Hill Hospital, Halifax, N.S.	Physiological Studies in the Treatment of Chronic Pulmonary Disease. (Project 30-52(a))	1,440-1962-63
119	Dr. C.A. Gordon, Medical Specialist, Camp Hill Hospital, Halifax, N.S.	Co-ordinated Study of Chronic Bronchitis. (Project 30-52(b))	3,500-1952-53 6,800-1953-54 7,140-1954-55 6,440-1955-56 8,900-1956-57 6,920-1957-58 7,920-1958-59 7,280-1959-60 8,030-1960-61 8,420-1961-62 8,780-1962-63
120	Dr. J.C. Paterson, Chief of Service, Laboratory, Westminster Hospital, London, Ont.	Factors in the Production of Coronary Artery Disease. (Project 35-52)	2,188-1953-54 2,560-1954-55 2,520-1955-56 2,640-1956-57 3,600-1957-58 4,871-1958-59 4,740-1959-60 5,160-1960-61 4,320-1961-62 4,320-1962-63

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<u>List</u>			
<u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
121	Dr. Ian Macdonald, Chief of Service, Medicine, Sunnybrook Hospital, Toronto, Ont.	The Clinical and Biochemical Study of Certain Aspects of Atherosclerosis. (Project 41-52)	\$ 3,875-1952-53 4,025-1953-54 6,080-1954-55 9,710-1955-56 9,351-1956-57 11,770-1957-58 11,955-1958-59 12,000-1959-60 12,100-1960-61 13,035-1961-62 18,300-1962-63
122	Dr. R.M. Christensen, Research Fellow, Dr. H.W. McIntosh, Director of Research, Shaughnessy Hospital, Vancouver, B.C.	Studies on the Metabolic Response to Surgery. (Project 13-53)	2,470-1953-54 2,600-1954-55 2,600-1955-56 2,720-1956-57 2,840-1957-58 Nil thereafter
123	Dr. H.W. McIntosh, Director of Research, Dr. Marvin Darrach, Professor of Biochemistry, U.B.C., Shaughnessy Hospital, Vancouver, B.C.	Determination of Blood Steroid Levels in Health and Stress. (Project 1-54)	500-1954-55 400-1955-56 400-1956-57 400-1957-58 250-1958-59 500-1959-60 500-1960-61 Nil-1961-62
124	Dr. C.J. Pattee, Director, C.I.U., Dr. B.E. Murphy, Research Fellow, Queen Mary Veterans Hospital, Montreal, P.Q.	Study of Obesity. (Project 10-54)	500-1954-55 Nil thereafter
125	Dr. J.C. Colbeck, Chief of Service, Pathology, Shaughnessy Hospital, Vancouver, B.C.	Investigation of the Control of Nosocomial Infections. (Project 23-54)	2,880-1954-55 4,410-1955-56 6,670-1956-57 9,150-1957-58 7,441-1958-59 7,740-1959-60 7,455-1960-61 8,003-1961-62 8,153-1962-63
126	Dr. J.B. Derrick, Asst. Professor of Med. Research, U.W.O., Dr. D. Bocking, Consultant Rheumatologist, Dr. R.J. Rossiter, Consultant - Biochemistry, Dr. J.A.F. Stevenson, Consultant - Physiology, Westminster Hospital, London, Ont.	The Metabolism of Amino Acids in Normal and Diseased States. (Project 10-55)	200-1955-56 500-1958-59 195-1960-61 200-1961-62 662-1962-63

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<u>List No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
127	Dr. M.A. Ogryzlo, Dr. J.A. Dauphinee, Dr. A.A. Fletcher, Consultants in Medicine, Sunnybrook Hospital, Toronto, Ont.	Plasma Protein Studies. (Project 25-55).	\$ 2,270-1955-56 2,040-1956-57 2,040-1957-58 2,780-1958-59 2,240-1959-60 2,440-1960-61 2,440-1961-62 2,440-1962-63
128	Dr. Ian Macdonald, Chief of Service, Medicine, Dr. C. Ezrin, Consultant in Medicine, Sunnybrook Hospital, Toronto, Ont.	Investigation of the Use of Radio- isotopes in Diagnosis, Treatment and Clinical Investigation. Continuation of investigation and treatment of Disorders of the Thyroid Gland with Radio-iodine. (Project 27-55)	2,595-1956-57 1,800-1957-58 2,400-1959-60 2,400-1960-61 2,400-1961-62 2,400-1962-63
129	Dr. T.E. Dancy, Psychiatrist-in- Chief, Dr. F.W. Lundell, Psychiatric Research, Queen Mary Veterans Hospital, Montreal, P.Q.	Critical Assessment of Background Material in Schizophrenic Veterans. (Project 16-56)	5,000-1956-57 7,000-1957-58 7,000-1958-59 7,000-1959-60 5,525-1960-61 Nil-1961-62
130	Dr. M. Kaye, Consultant in Medicine, Dr. G.W. Halpenny, Chief of Service - Medicine, Queen Mary Veterans Hospital, Montreal, P.Q.	A Systematic Study of Various Aspects of Renal Physiology and Disease. (Project 26-56)	5,825-1956-57 6,235-1957-58 7,640-1958-59 7,540-1959-60 7,740-1960-61 7,845-1961-62 9,070-1962-63
131	Dr. T.E. Dancy, Psychiatrist-in- Chief, Dr. F.W. Lundell, Psychiatric Research, Queen Mary Veterans Hospital, Montreal, P.Q.	The Ataractic Drugs. (Project 33-56)	Nil
132	Dr. D. deJong, Co-ordinator, Dr. H. Elliott, Director of Neurosurgery, Dr. B.D. Burns, Research Consultant, Dr. A. Kral, Psychiatrist, Dr. B. Wigdor, Psychologist, Dr. W. Tatlow, Neurologist, Queen Mary Veterans Hospital, Montreal, P.Q.	An Investigation of Parkinson's Syndrome (Part I) (Project 14-57(I))	6,200-1957-58 5,146-1958-59 8,270-1959-60 12,350-1960-61 9,300-1961-62 10,900-1962-63

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<u>List</u>			
<u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
133	Dr. Harold Elliott, Director of Neurosurgery, Queen Mary Veterans Hospital, Montreal, P.Q.	Parkinson Project - Part II (Project 14-57(II))	Nil
134	Dr. J.F. Mustard, Sr. Research Associate, Sunnybrook Hospital, Toronto, Ont.	A Study of the Activation of the Coagulation Mechanism during Alimentary Lipemia and its relationship to Thrombosis and Atherosclerosis. (Project 23-57)	\$ 5,635-1957-58 12,679-1958-59 9,210-1959-60 10,065-1960-61 19,310-1961-62 17,906-1962-63
135	Dr. T.E. Dancey, Psychiatrist-in- Chief, Dr. F.W. Lundell, Psychiatric Research, Dr. A.S. Macpherson, Research Scientist, Queen Mary Veterans Hospital, Montreal, P.Q.	A Study of the Psychodynamic and Social Aspects of the Compensation Problem. (Project 25-57)	3,600-1960-61 (on '10-61')
136	Dr. C.R. Woolf, Research Associate, Sunnybrook Hospital, Toronto, Ont.	1. To create a Respiratory Function Unit for the Assessment of the Treatment and Pathogenesis of Respiratory Diseases. 2. To investigate the Pathogenesis of Chronic Bronchitis by Respiratory Function Techniques. (Project 27-57)	2,890-1957-58 7,270-1958-59 6,940-1959-60 7,880-1960-61 8,830-1961-62 7,783-1962-63
137	Dr. D.H. Copp, Consultant in Physiology, Dr. H.W. McIntosh, Director of Research, Shaughnessy Hospital, Vancouver, B.C.	Studies of Metabolic Bone Disease and Disorders of Calcium Metabolism. (Project 15-58)	5,170-1961-62 4,020-1962-63
138	Dr. H.W. McIntosh, Director of Research, Shaughnessy Hospital, Vancouver, B.C.	Metabolic Studies on Patients with Renal Calculi. (Project 17-58)	2,000-1960-61 Nil thereafter
139	Dr. D.A. Howell, Consultant in Neurology, Queen Mary Veterans Hospital, Montreal, P.Q.	An Investigation into the Cause of Signs and Symptoms in Intracranial Haemorrhage. (Project 23-58)	1,500-1958-59 1,500-1959-60 1,728-1960-61 1,728-1961-62 1,728-1962-63
140	Dr. M.A. Ogryzlo, Consultant in Medicine, Sunnybrook Hospital, Toronto, Ont.	The Effect of Dietary Factors and Various Uricosuric Agents on the Renal Clearance of Uric Acid in Chronic Gout. (Project 24-58)	2,910-1958-59 3,060-1959-60 3,210-1960-61 3,780-1961-62 3,780-1962-63
141	Dr. D.P. Snidal, Part-time Investigator, Deer Lodge Hospital, Winnipeg, Man.	The Relationship of Diffusing Capacity to Intrapulmonary Mixing in Normals and in Patients with Pulmonary Emphysema. (Project 26-58(a))	Nil

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<u>List</u>			
<u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
142	Dr. D.P. Snidal, Part-time Investigator, Deer Lodge Hospital, Winnipeg, Man.	Co-ordinated Study of Chronic Bronchitis. (Project 26-58(b))	\$ 6,300-1958-59 2,400-1958-60 10,490-1960-61 11,420-1961-62 11,200-1962-63
143	Dr. Walter Zingg, Dr. Mark Nickerson, Consultants in Surgery, Deer Lodge Hospital, Winnipeg, Man.	A Study of the Alterations in Maximum Muscle Blood Flow produced by drugs. (Project 4-59)	200-1959-60 150-1960-61 150-1961-62 200-1962-63
144	Dr. A. Aronoff, Consultant in Medicine, Dr. G.W. Halpenny, Chief of Service - Medicine, Queen Mary Veterans Hospital, Montreal, P.Q.	Studies in the Pathogenesis, Diagnosis and Treatment of various Forms of Liver Disease. (Project 9-59)	125-1959-60 100-1960-61 3,830-1961-62 3,743-1962-63
145	Dr. A.W. Harrison, Consultant in Surgery, Sunnybrook Hospital, Toronto, Ont.	A Study of the Hemostatic Defects Found or Produced in Bleeding Patients. (Project 12-59)	4,240-1959-60 2,520-1960-61 2,640-1961-62 2,918-1962-63
146	Dr. W.S. Martin Director, Radioisotope Laboratory, Dr. L.P. Shapiro, Haematologist, Queen Mary Veterans Hospital, Montreal, P.Q.	The Detection of Variations of Blood Clotting by Electrical Means. (Project 17-59)	4,000-1962-63
147	Dr. David Bates, Director, Respiratory Division, Royal Victoria Hospital, Montreal, P.Q.	Co-ordinated Study on Chronic Bronchitis. (Project 18-59)	12,800-1959-60 3,700-1960-61 1,700-1961-62 4,800-1962-63
148	Dr. C.J. Pattee, Director, C.I.U., Dr. B.E. Murphy, Research Fellow, Queen Mary Veterans Hospital, Montreal, P.Q.	Corticosteroid Metabolism in Liver Disease. (Project 19-59)	Nil
149	Dr. A.W. Harrison, Consultant in Surgery, Sunnybrook Hospital, Toronto, Ont.	A Study of Fat Absorption in the Post-Gastrectomy Patient (and its role in the post-gastrectomy syndrome). (Project 23-59)	2,400-1960-61 2,520-1961-62 3,000-1962-63
150	Dr. W.R. Harris, Consultant in Orthopaedic Surgery, Sunnybrook Hospital, Toronto, Ont.	Follow-up Studies on Amputations and Prostheses. (Project 5-60)	3,500-1960-61 3,000-1961-62 3,858-1962-63

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<u>List No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
151	Dr. John Duffin, Chief of Service, Laboratory, Col. Belcher Hospital, Calgary, Alta.	The Evaluation of Thyroid Function Using the Plasma Protein-bound I-131 level correlated with Plasma Inorganic I-131 level and Thyroid I-131 Uptake Studies. (Project 8-60)	Nil
152	Dr. M. Aronovitch, Consultant in Chest Disease, Queen Mary Veterans Hospital, Montreal, P.Q.	Chemotherapy of Bronchogenic Carcinoma. (Project 25-60)	Nil
153	Dr. J.C. Paterson, Chief of Service - Laboratory, Westminster Hospital, London, Ont.	Attempts to Demonstrate Proteolytic Enzymes in Paneth Cells of the large Intestine. (Project 27-60)	350-1961-62 Nil
154	Dr. G.A. Lawson, Head of Physical Medicine, Dr. C.M. Godfrey, Consultant in Physical Medicine, Sunnybrook Hospital, Toronto, Ont.	The Effect of Ultrasonic Waves on Nerve Tissue. (Project 5-61)	751-1961-62 550-1962-63
155	Dr. John Duffin, Chief of Service - Laboratory Col. Belcher Hospital, Calgary, Alta.	The I-131 Saliva Index, as a measurement of Thyroid Function. (Project 7-61)	Nil
156	Dr. A.E. Thomson, Director, C.I.U., Deer Lodge Hospital, Winnipeg, Man.	In Vivo Dialysis in the Management of Subjects with Renal Failure. (Project 9-61)	1,500-1961-62 6,620-1962-63
157	Dr. T.E. Dancy, Psychiatrist-in- Chief, Dr. F.W. Lundell, Psychiatric Research, Dr. A.S. Macpherson, Research Scientist, Queen Mary Veterans Hospital, Montreal, P.Q.	Psychiatric Research Program - Queen Mary Veterans and Ste. Anne's Hospitals. (Project 10-61)	13,058-1961-62 14,610-1962-63
158	Dr. T.E. Dancy, Psychiatrist-in- Chief, Dr. F.W. Lundell, Psychiatric Research, Dr. A.S. Macpherson, Research Scientist, Queen Mary Veterans Hospital, Montreal, P.Q.	Part I - Evaluation of Psychiatric Factors and Hydrocortisone production rates in these patients using C14 Hydro- cortisone. Part II - Evaluation of Hydrocortisone production rates and weight change in depressed patients, using C14 Hydrocortisone. (Project 11-61)	(on '10-61')

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<u>List No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
159	Dr. T.E. Dancey, Psychiatrist-in-Chief, Dr. F.W. Lundell, Psychiatric Research, Queen Mary Veterans Hospital, Montreal, P.Q.	A Study of Critical Flicker Fusion Frequency in Different Groups of Schizophrenic Patients. (Project 12-61)	(on '10-61')
160	Dr. T.E. Dancey, Dr. F.W. Lundell, Dr. A.S. Macpherson, Queen Mary Veterans Hospital, Montreal, P.Q.	A Study in Conjunction with the Department of Medicine of the the Psychiatric and Metabolic Disturbances in Chronic Alcoholism. (Project 13-61)	(on '10-61')
161	Dr. J.C. Mitchell, Clinical Instructor, Dermatology, Shaughnessy Hospital, Vancouver, B.C.	The Distribution Patterns of Psoriasis. Observations on the Koebner response. (Project 20-61)	\$2,400-1961-62 3,000-1962-63
162	Mr. Georges Filteau, Biochemist, Dr. Jacques Bergeron, Resident in Medicine, Ste. Foy Hospital, Quebec, P.Q.	Effect of a Light Meal on Blood Constituents. (Project 22-61)	4,743-1962-63
163	Dr. R.P. Belcourt, Bacteriologist, Ste. Foy Hospital, Quebec, P.Q.	Investigation of Enterovirus carrier state (or excretion) in hospitalized veterans. (Project 25-61)	1,820-1962-63
164	Dr. Gordon E. Dower, Consultant in Medicine, Shaughnessy Hospital, Vancouver, B.C.	Clinical Trial of the Polar- cardiograph (PCG). (Project 28-61)	710-1962-63
165	Dr. Doris Nicholls, Laboratory Executive Officer, Westminster Hospital, London, Ont.	Biochemical Studies of Normal and Diseased Kidneys. (Project 1-62)	N11
166	Dr. L.N. Roberts, Medical Specialist, Veterans Hospital, Victoria, B.C.	allistocardiographic Patterns, Cardiac Output and their correlation in Human Cardiac Infarction. (Project 3-62)	347-1962-63
167	Dr. Ian MacKenzie, Professor of Surgery, Dalhousie University, Camp Hill Hospital, Halifax, N.S.	Investigation of the Anti-viral properties of Human Splenic Extract. (Project 4-62)	N11
168	Dr. R.N. Anderson, Specialist in Internal Medicine, Camp Hill Hospital, Halifax, N.S.	The Pulmonary Circulation in Pul- monary Emphysema: Its response to Exercise and to Continuous Acetylcholine Infusion. (Project 5-62)	4,654-1962-63

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<u>List No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
169	Dr. W.H. Sutherland, Deputy Chief of Service - Surgery, Shaughnessy Hospital, Vancouver, B.C.	An Investigation into Suture Rejection in Postoperative Patients. (Project 6-62)	N11
170	Dr. Brock M. Fahrni, Director of A. & R. Unit, Shaughnessy Hospital, Vancouver, B.C.	Statistical Determination of the Treatment and Accommodation for Old Age Patients. (Project 7-62)	\$ 5,880-1962-63
171	Dr. H.W. McIntosh, Director of Research, Shaughnessy Hospital, Vancouver, B.C.	To Determine the Effect of Sul- phated Polymannuronides (Paritol) on Some Aspects of Fat Metabolism. (Project 8-62)	200-1962-63
172	Dr. C.J. Pattee, Director of C.I.U., Dr. B.E. Murphy, Research Fellow, Queen Mary Veterans Hospital, Montreal, P.Q.	Protein-binding of Cortisol in various conditions. (Project 9-62)	N11
173	Dr. M.H. Gault, Director of Medical Chemistry, Queen Mary Veterans Hospital, Montreal, P.Q.	SERUM P.S.P.-Determination of range in normal and abnormal patients; correlation with urinary PSP and other renal function tests. (Project 11-62)	3,705-1962-63
174	Dr. M.H. Gault, Director of Medical Chemistry, Queen Mary Veterans Hospital, Montreal, P.Q.	ENZYME STUDIES: 1. In Renal Disease & Neoplasia of the genito-urinary tract. 2. Liver Disease. 3. Pulmonary Disease. (Project 12-62)	245-1962-63
175	Dr. Hugh A. Smythe, Consultant in Medicine, Sunnybrook Hospital, Toronto, Ont.	A Study of the Influence of Diseases, Diets, and Drugs on the Metabolism of Uric Acid. (Project 13-62)	4,700-1962-63
176	Dr. H.W. McIntosh, Director of Research, Dr. Marvin Darrach, Professor of Biochemistry, U.B.C., Shaughnessy Hospital, Vancouver, B.C.	Release of Calcium Chelating Agents by Kidney Enzymes. (Project 14-62)	N11
177	Mr. Georges Filteau, Biochemist, Ste. Foy Hospital, Quebec, P.Q.	Determination of Gonadotropins in Health and Disease by paper Electrophoresis. (Project 15-62)	3,893-1962-63

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<u>List</u> <u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
178	Dr. D.M. Simpson, Bacteriologist, Dr. C.E. vanRooyen, Consultant in Bacteriology, Camp Hill Hospital, Halifax, N.S.	A Study of Virulence and Epidemic Potential of Staphylococcus Pyogenes. (Project 17-62)	\$ 3,930-1962-63
179	Dr. C.M. Harlow, Chief of Service, Laboratory, Dr. Lea Steeves, Assoc. Professor of Medicine at Dalhousie, Dr. Robert Ackman, Chemist, Fisheries Research Board, Camp Hill Hospital, Halifax, N.S.	The long term effect of Regular Exercise on Balanced Diets in which fish is one of the main sources of Protein and unsaturated Fatty Acids on males with (1) Obesity, (2), Ischemic Heart Disease, (3) Familial Hyper- cholesteremia. (Project 18-62)	3,905-1962-63
180	Dr. John T. MacLean, Director of Urology, Queen Mary Veterans Hospital, Montreal, P.Q.	Renal Blood Flow - 1) Physiology of kidney, ureter, bladder, as determined by recording intrapelvic pressures by manometric and electronic methods. 2) Study of the Renal Blood Flow and Renal Artery Stenosis in Paraplegics. (Project 19-62)	3,405-1962-63
181	Dr. Stevens T. Norvell, Assistant Professor, Dalhousie University, Camp Hill Hospital, Halifax, N.S.	An Investigation into the Blood Volumes of Certain Debilitated Elderly patients who are Potential candidates for surgical operations. (Project 21-62)	4,052-1962-63
182	Dr. J.C. Cairns, Dr. C.H. Young, Specialists in Internal Medicine, Dr. C.P. Handforth, Specialist in Pathology, Camp Hill Hospital, Halifax, N.S.	A study of Small Bowel Biopsy in the older patients. (Project 22-62)	100-1962-63
183	Dr. J.R.D. Bayne, Physician i/c Gerontology, Ste. Anne's Hospital, Montreal, P.Q.	Investigation of Social Factors relating to the Discharge of the Chronically Ill Veterans from Hospital. (Project 24-62)	6,634-1962-63
184	Dr. A. Bogoch, Consultant in Medicine, Shaughnessy Hospital, Vancouver, B.C.	Undigested Meat Fibres in the Stools after Partial Gastrectomy. (Project 25-62)	N11

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<u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
185	Dr. E. Ainslie, Asst. to Chief of Service -Medicine, Sunnybrook Hospital, Toronto, Ont.	The Effect of the Kind of Fat in the Diet on Morbidity and Mortality in an aging Male population. (Project 26-62)	\$15,850-1962-63
186	Dr. H.S. Mitchell Consultant in Allergy, Queen Mary Veterans Hospital, Montreal, P.Q.	Review of Clinical History and postmortem findings in chronic bronchitis and asthma; with special reference to duration of life after initial symptoms, associated diseases, occupational and social background, and comparison with groups of similar cases in Great Britain and Wales. (Project 27-62)	600-1962-63
187	Dr. J.R.D. Bayne, Physician i/c Gerontology Ste. Anne's Hospital, Montreal, P.Q.	A project to test the response of War Veterans with a long term Ethanol Addiction to Psycho-Social Therapy in a Domiciliary Care setting. (Project 28-62)	1,500-1962-63

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<u>List</u>			
<u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
100	Clinical Investigation Unit, Queen Mary Veterans Hospital, Montreal.	Operation of Clinical Investigation Unit - Queen Mary Veterans Hospital. (Project 14-50) A17/B38	Nil-1950/51 \$38,500-1951/52 34,340-1952/53 34,385-1953/54 36,460-1954/55 35,985-1955/56 36,505-1956/57 39,080-1957/58 24,042-1958/59 24,450-1959/60 28,980-1960/61 32,428-1961/62
101	Clinical Investigation Unit, Westminster Hospital, London.	Operation of Clinical Investigation Unit - Westminster Hospital. (Project 17-50) A17/B38	Nil-1950/51 35,500-1951/52 34,946-1952/53 33,920-1953/54 35,330-1954/55 34,010-1955/56 33,900-1956/57 35,100-1957/58 22,484-1958/59 22,220-1959/60 23,540-1960/61 26,663-1961/62
102	Dr. J.C. Paterson, Dr. J.A. McLachlin, Westminster Hospital, London.	Studies on Phlebothrombosis and Pulmonary Embolism. (Project 20-50) A14/B5	4,410-1950/51 8,051-1951/52 7,388-1952/53 2,147-1953/54 Nil thereafter
103	Clinical Investigation Unit, Sunnybrook Hospital, Toronto.	Operation of Clinical Investigation Unit - Sunnybrook Hospital. (Project 21-50) A17/B38	Nil-1950/51 41,310-1951/52 42,100-1952/53 40,780-1953/54 38,030-1954/55 37,145-1955/56 39,225-1956/57 43,187-1957/58 22,638-1958/59 24,850-1959/60 28,750-1960/61 32,800-1961/62
104	Dr. R.E.G. Place, Queen Mary Veterans Hospital, Montreal.	Continuation of Investigation of Etiological Factors and Physiological Status in cases of Chronic Bronchitis and Bronchiectasis. (Project 27-50) A17/B24	5,935-1950/51 7,570-1951/52 4,728-1952/53 4,908-1953/54 7,035-1954/55 5,080-1955/56 6,525-1956/57 7,820-1957/58 8,911-1958/59 7,990-1959/60 7,490-1960/61 8,120-1961/62

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105	Clinical Investigation Unit, Shaughnessy Hospital, Vancouver.	Operation of Clinical Investiga- tion Unit - Shaughnessy Hospital. (Project 29-50) A17/B38.	\$ Nil-1950/51 37,368-1951/52 35,966-1952/53 35,880-1953/54 36,010-1954/55 36,730-1955/56 37,900-1956/57 39,440-1957/58 21,783-1958/59 21,360-1959/60 23,373-1960/61 27,288-1961/62
106	Dr. E.H. Botterell, Sunnybrook Hospital, Toronto.	Disturbances in Bladder and Bowel Functions in Paraplegic Patients. (Project 46-50) A18/B22.	1,900-1950/51 3,940-1951/52 3,700-1952/53 2,952-1953/54 3,400-1954/55 3,640-1955/56 3,635-1956/57 3,640-1957/58 3,540-1958/59 3,700-1959/60 3,640-1960/61 4,640-1961/62
107	Dr. J.A. Dauphinee, Sunnybrook Hospital, Toronto.	Studies of Liver Function in Chronic Liver Diseases. (Project 19-51) A17/B18	3,660-1951/52 5,860-1952/53 4,835-1953/54 5,990-1954/55 3,850-1955/56 4,254-1956/57 3,300-1957/58 4,850-1958/59 6,360-1959/60 6,510-1960/61 7,080-1961/62
108	Dr. A.J. Elliott, Sunnybrook Hospital, Toronto.	Clinical Studies in Ophthalmology. (Project 22-51) A25/B12	6,212-1951/52 500-1952/53 11-1953/54 Nil thereafter
109	Dr. E.V. Metcalfe, Dr. G.E. Hobbs, Dr. J.A.F. Stevenson, Westminster Hospital, London.	A Study of Adrenocortical and Autonomic Function and of Phosphate Metabolism in Schizophrenia, and of Diagnosis and Prognosis of this Disease. (Project 31-51) A30,11/B27	3,202-1951/52 3,660-1952/53 5,920-1953/54 5,120-1954/55 5,615-1955/56 5,340-1956/57 6,000-1957/58 6,300-1958/59 7,250-1959/60 7,550-1960/61 8,600-1961/62

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<u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
110	Clinical Investigation Unit, Deer Lodge Hospital, Winnipeg.	Operation of Clinical Investigation Unit - Deer Lodge Hospital. (Project 36-51) A17/B38.	2,400-1951/52 4,900-1952/53 9,860-1953/54 11,170-1954/55 17,140-1955/56 24,072-1956/57 26,280-1957/58 17,150-1958/59 18,180-1959/60 22,255-1960/61 35,140-1961/62
111	Dr. C.E. Corrigan, Deer Lodge Hospital, Winnipeg.	Review of Herniorrhaphy Records with Special Emphasis on Recurrence Rates. (Project 40-51) A14/B15	350-1951-52 Nil thereafter
112	Mr. C.S. Boccia, Prosthetic Centre, Sunnybrook Hospital, Toronto.	Investigation of Materials and Design of Joints and Assemblies in Artificial Limbs and Orthopaedic Appliances. (Project 48-51) A23/B7	3,780-1951/52 533-1957/58 46-1958/59 500-1959/60 500-1960/61 Nil-1961/62
113	Dr. J.A. Lewis, Dr. C.E. Lockwood, Dr. D.A. Kavelman, Westminster Hospital, London.	The continued study of Hypertension. (a) Pharmacologically induced alterations in renal function. (b) Clinical trials of new therapeutic disciplines in treatment. (Project 49-51) A17/B5.	693-1954/55 171-1958/59 Nil thereafter
114	Dr. A.E. Thomson, Deer Lodge Hospital, Winnipeg.	Abnormalities of Sodium Homeostasis and Vascular Smooth Muscle Tone in Hypertension. (Project 58-51) A17/B5.	3,025-1951/52 1,850-1952/53 6,200-1953/54 6,865-1954/55 3,600-1955/56 600-1956/57 520-1957/58 350-1958/59 200-1959/60 250-1960/61 500-1961/62
115	Dr. A.A. Branch, Lancaster Hospital, Saint John.	Survey of Antibiotic Laboratory Tests for Sensitivity and Resistance of Pathogenic Bacteria. (Project 60-51) A5,27/B38.	304-1951/52 4,490-1952/53 6,300-1953/54 7,750-1954/55 5,170-1955/56 4,444-1956/57 5,550-1957/58 5,032-1958/59 3,740-1959/60 3,890-1960/61 6,720-1961/62

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<u>List</u> <u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
116	Dr. J.C. Paterson, Westminster Hospital, London.	Blood Lipids and Arteriosclerosis in Schizophrenics. (Project 14-52) A25/B5.	3,040-1952/53 2,717-1953/54 5,166-1954/55 5,385-1955/56 6,300-1956/57 5,960-1957/58 7,045-1958/59 8,890-1959/60 9,070-1960/61 10,330-1961/62
117	Dr. C.A. Gordon, Camp Hill Hospital, Halifax.	Physiological Studies in the Treatment of Chronic Pulmonary Disease. (Project 30-52) A17,28/B24.	3,500-1952/53 6,800-1953/54 7,140-1954/55 6,440-1955/56 8,900-1956/57 6,920-1957/58 7,920-1958/59 7,280-1959/60 8,030-1960/61 8,420-1961/62
118	Dr. J.C. Paterson, Westminster Hospital, London.	Factors in the Production of Coronary Artery Disease. (Project 35-52) A17/B14.	2,188-1953/54 2,560-1954/55 2,520-1955/56 2,640-1956/57 3,600-1957/58 4,871-1958/59 4,740-1959/60 5,160-1960/61 4,320-1961/62
119	Dr. Ian Macdonald, Sunnybrook Hospital, Toronto.	The Clinical and Biochemical Study of Certain Aspects of Atherosclerosis. (Project 41-52) A17/B5.	3,875-1952/53 4,025-1953/54 6,080-1954/55 9,710-1955/56 9,351-1956/57 11,770-1957/58 11,955-1958/59 12,000-1959/60 12,100-1960/61 13,035-1961/62
120	Dr. H.W. McIntosh, Dr. R.M. Christensen, Shaughnessy Hospital, Vancouver.	Studies on the Metabolic Response to Surgery. (Project 13-53) A14/B31.	2,470-1953/54 2,600-1954/55 2,600-1955/56 2,720-1956/57 2,840-1957/58 Nil thereafter
121	Dr. H.W. McIntosh, Dr. M. Darrach, Shaughnessy Hospital	Determination of Blood Steroid Levels in Health and Stress. (Project 1-54) A6,36/B38.	500-1954/55 400-1955/56 400-1956/57 400-1957/58 250-1958/59 500-1959/60 500-1960/61 Nil-1961/62

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List No.	Director	Project Title and Number	Financial History
122	Dr. C.J. Pattee, Dr. R.R. Gillies, Queen Mary Veterans Hospital, Montreal.	Study of Obesity. (Project 10-54) A17/B38.	500-1954/55 Nil thereafter
123	Dr. J.C. Colbeck, Shaughnessy Hospital, Vancouver.	Investigation of the Control of Nosocomial Infections with particular reference to the Staphylococcus Aureus. (Project 23-54) A5/B38.	2,880-1954/55 4,410-1955/56 6,670-1956/57 9,150-1957/58 7,441-1958/59 7,740-1959/60 7,455-1960/61 8,003-1961/62
124	Dr. J.L. Guravich, Lancaster Hospital, Saint John.	A Study of Familial Hypercholesteremia with and without Xanthomatosis. (Project 34-54) A17,6/B32.	400-1954/55 1,050-1955/56 3,850-1956/57 1,300-1957/58 1,408-1958/59 3,100-1959/60 4,900-1960/61 1,200-1961/62
125	Dr. J.B. Derrick, Dr. D. Bocking, Dr. R.J. Rossiter, Dr. J.A.F. Stevenson, Westminster Hospital, London.	The Metabolism of Amino Acids in Normal and Diseased States. (Project 10-55) A6/B38.	200-1955/56 500-1958/59 195-1960/61 200-1961/62
126	Dr. M.A. Ogryzlo, Dr. J.A. Dauphinee, Dr. A.A. Fletcher, Sunnybrook Hospital, Toronto.	Plasma Protein Studies. (Project 25-55) A6/B7.	2,270-1955/56 2,040-1956/57 2,040-1957/58 2,780-1958/59 2,240-1959/60 2,440-1960/61 2,440-1961/62
127	Dr. Ian Macdonald, Dr. C. Ezrin, Sunnybrook Hospital, Toronto.	Investigation of the Use of Radio- isotopes in Diagnosis, Treatment and Clinical Investigation. (Project 27-55) A17/B32.	2,595-1956/57 1,800-1957/58 2,400-1959/60 2,400-1960/61 2,400-1961/62
128	Dr. D.P. Snidal, Deer Lodge Hospital, Winnipeg.	Changes in Pulmonary Function with Aging in Normals and Individuals with Chronic Pulmonary Disease. (Project 28-55) A28,15/B24.	Nil
129	Dr. R.A. Millar, Queen Mary Veterans Hospital, Montreal.	Assessment of Newer Halogenated Anaesthetic Agents. (Project 30-55) A7/B5.	2,500-1955/56 4,800-1956/57 3,500-1957/58 2,340-1958/59 3,135-1959/60 3,000-1960/61 Nil-1961/62

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<u>List No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
130	Dr. T.E. Dancy, Queen Mary Veterans Hospital, Montreal.	Critical Assessment of Background Material in Schizophrenic Veterans. (Project 16-56) A30/B27	5,000-1956/57 7,000-1957/58 7,000-1958/59 7,000-1959/60 5,525-1960/61 Nil-1961/62
131	Dr. C. Ezrin, Sunnybrook Hospital, Toronto.	The Use of Radiophosphorus (P32) in the Study of Phospholipid Metabolism in Endocrine Disorders. (Project 23-56) A11/52	590-1956/57 3,000-1957/58 3,000-1958/59 3,600-1959/60 3,780-1960/61 2,560-1961/62
132	Dr. M. Kaye, Dr. G.W. Halpenny, Queen Mary Veterans Hospital, Montreal.	A Systematic Study of Various Aspects of Renal Physiology and Disease. (Project 26-56) A28/B13.	5,825-1956/57 6,235-1957/58 7,640-1958/59 7,540-1959/60 7,740-1960/61 7,845-1961/62
133	Dr. F.W. Lundell, Queen Mary Veterans Hospital, Montreal.	The Ataractic Drugs. (Project 33-56 a,b,c) A27/B27	Nil
134	Dr. C.E. vanRooyen, Dr. R.C. Dickson, Dr. D.M. Simpson, Camp Hill Hospital, Halifax.	A Study of the Pattern of Antibiotic Resistance in the Alimentary Tract of Patients prior to and after Broad Spectrum Antibiotic Therapy, etc. (Project 6-57) A27/B29	2,700-1957-58 2,120-1958/59 2,800-1959/60 3,460-1960/61 3,905-1961/62
135	Dr. H. Elliott, Dr. B.D. Burns, Dr. D. deJong, Queen Mary Veterans Hospital, Montreal.	Parkinson Project. (Project 14-57) A18/B22	6,200-1957/58 5,146-1958/59 8,270-1959/60 12,350-1960/61 9,300-1961/62
136	Dr. C.M. Harlow, Dr. L.C. Steeves, Dr. R. Ackman, Camp Hill Hospital, Halifax.	The Long Term Effect of Balanced Diets in which Fish is one of the main sources of Protein and unsaturated Fatty Acids on Males with (1) Obesity, (2) Ischemic Heart Disease, (3) Familial Hyper- cholesteremia. (Project 22-57) A6,17/B5	5,200-1957/58 5,100-1958/59 3,710-1959/60 3,380-1960/61 3,943-1961/62
137	Dr. Ian Macdonald, Sunnybrook Hospital, Toronto.	A Study of the Activation of the Coagulation Mechanism during Alimentary Lipemia and its Relation- ship to Thrombosis and Atherosclerosis. (Project 23-57) A7/B5	5,635-1957/58 12,679-1958/59 9,210-1959/60 10,065-1960/61 19,310-1961/62

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<u>List</u> <u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
138	Dr. T.E. Dancy, Dr. F.W. Lundell, Queen Mary Veterans Hospital, Montreal.	A Study of the Psychodynamic and Social Aspects of the Compensation Problem. (Project 25-57 a,b) A33/B23.	3,600-1960/61 Nil-1961/62
139	Dr. G.R. Woolf, Sunnybrook Hospital, Toronto.	To Create a Respiratory Function Unit for the Assessment of the Treatment and Pathogenesis of Respiratory Diseases. (Project 27-57) A17/B24.	2,890-1957/58 7,270-1958/59 6,940-1959/60 7,880-1960/61 8,830-1961/62
140	Dr. M.J. Tuttle, Col. Belcher Hospital, Calgary.	Pulmonary Function Studies. (Project 10-58) A28(17)/B24.	1,200-1958/59 2,790-1959/60 2,910-1960/61
141	Dr. C.W. Lockwood, Westminster Hospital, London.	A Continued Study of the Standard Clotting Time and Prothrombin Time as Methods of Evaluating Anti- coagulation in Patients on Anticoagulant Therapy. (Project 11-58) A16/B5.	Nil
142	Dr. D.H. Copp, Dr. H.W. McIntosh, Shaughnessy Hospital, Vancouver.	Studies of Metabolic Bone Disease and Disorders of Calcium Metabolism. (Projects 15-58 and 16-58 combined) A31/B7.	5,170-1961/62
143	Dr. H.W. McIntosh, Shaughnessy Hospital, Vancouver.	Metabolic Studies of Patients with Renal Calculi. (Project 17-58) A17(39)/B13.	2,000-1960/61 Nil-1961/62
144	Dr. D.A. Howell, Queen Mary Veterans Hospital, Montreal.	An Investigation into the Cause of Signs and Symptoms in Intracranial Haemorrhage. (Project 23-58) A18(7)/B22.	1,500-1958/59 1,500-1959/60 1,728-1960/61 1,728-1961/62
145	Dr. M.A. Ogryzlo, Sunnybrook Hospital, Toronto.	The Effect of Dietary Factors and Various Uricosuric Agents on the Renal Clearance of Uric Acid in Chronic Gout. (Project 24-58) A17/B7.	2,910-1958/59 3,060-1959/60 3,210-1960/61 3,780-1961/62
146	Dr. D.P. Snidal, Deer Lodge Hospital, Winnipeg.	The Relation of Diffusing Capacity to Intra-pulmonary mixing in Normals and in patients with Pulmonary Emphysema. (Project 26-58) A28(17)/B24.	2,610-1958/59 2,400-1959/60 10,490-1960/61 11,420-1961/62
147	Dr. H.A. Smythe, Sunnybrook Hospital, Toronto.	Investigation of Uric Acid Metabolism Using Uric Acid 2-C14. (Project 3-59) A6/B32.	200-1959/60 3,210-1960/61 3,863-1961/62

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148	Dr. Walter Zingg, Dr. Mark Nickerson, Deer Lodge Hospital, Winnipeg.	The Effect of Sympathomimetic Drugs on the Blood Flow in Skeletal Muscles. (Project 4-59) A27/B5	200-1959/60 150-1960/61 150-1961/62
149	Dr. D.A. Howell, Queen Mary Veterans Hospital, Montreal.	An Investigation into the Effect of Anticoagulants on Intermittent Cerebral Ischaemic Attacks. (Project 7-59) A7(16)/B5.	625-1960/61 Nil-1961/62
150	Dr. A. Aronoff, Dr. G.W. Halpenny, Queen Mary Veterans Hospital, Montreal.	Studies in the Pathogenesis, Diagnosis and Treatment of Various Forms of Liver Disease. (Project 9-59) A17/B1F.	125-1959/60 100-1960/61 3,830-1961/62
151	Dr. H.W. McIntosh, Dr. P. Constantinides, Shaughnessy Hospital, Vancouver.	Studies of Lipemia Clearing (Effect of Manuronate Therapy on Blood Lipid Pattern of Hyperlipemic Patients). (Project 11-59) A27/B6	Nil-1961/62
152	Dr. A.W. Harrison, Sunnybrook Hospital, Toronto.	A Study of the Haemostatic Defects Found or Produced in Bleeding Patients. (Project 12-59) A16/B3.	4,240-1959/60 2,520-1960/61 2,640-1961/62
153	Dr. W.S. Martin, Ste. Anne's Hospital, Ste Anne de Bellevue, P.Q.	The Detection of Variations of Blood Clotting by Electrical Means. (Project 17-59) A16/B3	Nil
154	Dr. David Bates, Respiratory Division, Royal Victoria Hospital, Montreal.	Co-ordinated Study on Chronic Bronchitis. (Project 18-59) A17/B24.	12,800-1959/60 3,700-1960/61 1,700-1961/62
155	Dr. C.J. Pattee, Dr. R.R. Gillies, Queen Mary Veterans Hospital, Montreal.	Corticosteroid Metabolism in Liver Disease. (Project 19-59) A17/B18.	Nil-1961/62
156	Dr. A.W. Harrison, Sunnybrook Hospital, Toronto.	A Study of Fat Absorption in the Post-Gastrectomy Patient (and its role in the Post-Gastrectomy Syndrome). (Project 23-59) A14(20)/B31.	2,400-1960/61 2,520-1961/62
157	Dr. W.R. Harris, Sunnybrook Hospital, Toronto.	Follow-up Studies on Amputations and Prosthesis. (Project 5-60) A32/B38	3,500-1960/61 3,000-1961/62

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<u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
158	Dr. John Duffin, Col. Belcher Hospital, Calgary.	The Evaluation of Thyroid Function Using the Plasma Protein-bound I-131 level Correlated with Plasma Inorganic I-131 Level and Thyroid I-131 Uptake Studies. (Project 8-60) A28/B38.	Nil
159	Dr. J.W. Dawson, Col. Belcher Hospital, Calgary.	Thyroid Function as Measured by I-131 in the Geriatric Male Population. (Project 10-60) A28(15)/B38.	Nil
160	Dr. L.N. Roberts, Veterans Hospital, Victoria.	Ballistocardiographic Patterns, Cardiac Output and their Correlation in Human Cardiac Infarction. (Project 15-60) A7/B14	100-1960/61 165-1961/62
161	Dr. M.M. Baird, Dr. H.W. McIntosh, Dr. G.C. Walsh, Shaughnessy Hospital, Vancouver.	To Study the Effect of ALDACTONE (SC 8109) on Patients in Congestive Heart Failure. (Project 21-60) A7(27)/B14.	Nil
162	Dr. Hugh Smythe, Sunnybrook Hospital, Toronto.	An Assessment of the Effects of NAPA (N-acetylpara-aminophenol) on the Metabolism of Steroids. (Project 23-60) A27(11)/B38.	Nil
163	Dr. M. Aronovitch, Dr. J.F. Meakins, Dr. R. Place, Dr. L. Kahana, Queen Mary Veterans Hospital, Montreal.	Appraisal of Various Medications and Regimens for Pulmonary Emphysema. (Project 24-60) A27/B24.	3,000-1961/62
164	Dr. M. Aronovitch, Dr. J.F. Meakins, Dr. R. Place, Dr. L. Kahana, Queen Mary Veterans Hospital, Montreal.	Chemotherapy of Cancer. (Project 25-60) A27/B35.	Nil
165	Dr. J.C. Paterson, Westminster Hospital, London.	Attempts to Demonstrate Proteolytic Enzymes in Paneth Cells of the Large Intestine - A Pilot Study. (Project 27-60) A6/B9.	350-1961/62
166	Dr. C.H. Lockwood, Westminster Hospital, London.	Pyruvate Metabolism in Diabetes Mellitus. (Project 2-61) A28/B3.	Nil

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<u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
167	Dr. L.N. Roberts, Veterans Hospital, Victoria.	A Comparison of the Routine Pro- thrombin Time, the "Standard Clotting Time", and the Owren's Thrombo-test in the maintenance of Anticoagulant Therapy in humans. (Project 3-61) A16/B38.	Nil
168	Dr. G.A. Lawson, Dr. C.M. Godfrey, Sunnybrook Hospital.	The Effect of Ultrasonic Wave on Nerve Tissue. (Project 5-61) A32(18)/B38.	751-1961/62
169	Dr. J.D. Duffin, Col. Belcher Hospital, Calgary.	The I-131 Saliva Index, as a measure of Thyroid Function. (Project 7-61) A6(31)/B32.	Nil
170	Dr. A.E. Thomson, Deer Lodge Hospital, Winnipeg.	In Vivo Dialysis in the Management of Subjects with Renal Failure. (Project 9-61) A5/B13.	1,500-1961/62
171	Dr. T.E. Dancey, Dr. F.W. Lundell, Queen Mary Veterans Hospital, Montreal.	Psychiatric Research Program -Queen Mary Veterans and Ste. Anne's. (Project 10-61) A30/B38.	\$13,058-1961/62.
172	Dr. T.E. Dancey, Dr. F.W. Lundell, Queen Mary Veterans Hospital, Montreal.	A Study of the Relationship of Adrenocortical Production in Obesity in Conjunction with the Clinical Investigation Unit. (Project 11-61) A11/B23.	Nil
173	Dr. T.E. Dancey, Dr. F.W. Lundell, Queen Mary Veterans Hospital, Montreal..	A Study of Critical Flicker Fusion Frequency in Different Groups of Schizophrenic Patients. (Project 12-61) A27(30)/B27.	Nil
174	Dr. C.J. Pattee, Dr. R.R. Gillies, Queen Mary Veterans Hospital, Montreal.	Endogenous Hydrocortisone Production Rates in Various Conditions; e.g. post-operative state. (Project 14-61) A11/B38.	Nil
175	Dr. M. Aronovitch, Dr. J.F. Meakins, Dr. R. Place, Dr. R. Lain, Dr. L. Kahana, Dr. J. Chartier, Queen Mary Veterans Hospital, Montreal.	Evaluation of Needle Biopsies of Lungs and Pleura in the Diagnosis of Chest Diseases. (Project 15-61) A25/B35.	Nil

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Special Committee

<u>DEPARTMENT OF VETERANS AFFAIRS</u>			
<u>List</u>			
<u>No.</u>	<u>Director</u>	<u>Project Title and Number</u>	<u>Financial History</u>
176	Dr. M. Aronovitch, Dr. J.F. Meakins, Dr. R. Place, Dr. L. Kahana, Queen Mary Veterans Hospital, Montreal.	Assessment of Various Measures in the Diagnosis of Bronchogenic Carcinoma. (Project 16-61) A37/B35.	Nil
177	Dr. M. Aronovitch, Dr. J.F. Meakins, Dr. R. Place, Dr. L. Kahana, Queen Mary Veterans Hospital, Montreal.	The Treatment of Bronchial and Pulmonary Diseases by Tracheo- bronchial Infusion. (Project 17-61) A27-B24.	Nil
178	Dr. M. Aronovitch, Dr. R. Place, Dr. L. Kahana, Dr. T. Adams, Queen Mary Veterans Hospital, Montreal.	A Convenient time-saving method of doing Bronchograms. (Project 18-61) A31/B24.	Nil
179	Dr. J.C. Mitchell, University of B.C., Shaughnessy Hospital, Vancouver.	The Distribution Patterns of Psoriasis. Observations of the Hoebner Response. (Project 20-61) A10/B30.	2,400-1961/62.
180	Mr. Georges Filteau, Dr. E. Morin, Ste. Foy Hospital, Quebec.	Chromatographic Determination of Vitamin D in Avitaminosis and Alcoholism. (Project 21-61) A20(6)/B25.	3,830-1961/62
181	Mr. Georges Filteau, Dr. J. Bergeron, Ste. Foy Hospital, Quebec.	Effect of a light meal on Blood Constituents. (Project 22-61) A6(20)/B38.	Nil
182	Mr. Georges Filteau, Dr. Benoit Boucher, Dr. Jean Fortier, Ste. Foy Hospital, Quebec.	Cholesterol Capacity in Obesity and Coronary Thrombosis. (Project 23-61) A6/B14.	Nil
183	Dr. R.J.P. Belcourt, Ste. Foy Hospital, Quebec.	Investigation of Enterovirus Carrier State (or excretion) in hospitalized veterans. (Project 25-61) A5/B16.	Nil
184	Dr. Yves Morin, Ste. Foy Hospital, Quebec.	Acid Mucopolysaccharide Levels in Hyper-cholesterolemia and Myocardial Infarction. (Project 26-61) A6/B14.	5,330-1961/62

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